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THE MINE AND SMELTER SUPPLY COMPANY CATALOG No 24



ASSAYERS' AND CHEMISTS' SUPPLIES
LABORATORY EQUIPMENT

DENVER, COLO. EL PASO, TEXAS
SALT LAKE CITY, UTAH. MEXICO, D.F.
GENERAL OFFICES : NEW YORK CITY

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Chemistry - Instruments and Apparatus - Catalogue
of Apparatus - Apparatus and Supplies - "

T.D.

Advised
8/23/27
well

Catalog No. 24

★ THE MINE & SMELTER SUPPLY CO.

DEALERS, MANUFACTURERS AND IMPORTERS OF

Assayers' and Chemists' Supplies
Laboratory Equipment for Schools
and Colleges, Scientific Apparatus
=====and Instruments=====



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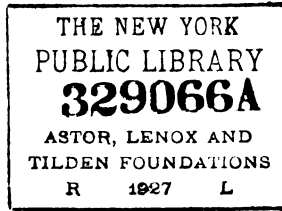
El Paso, Texas

Salt Lake City, Utah

Mexico City, D. F.

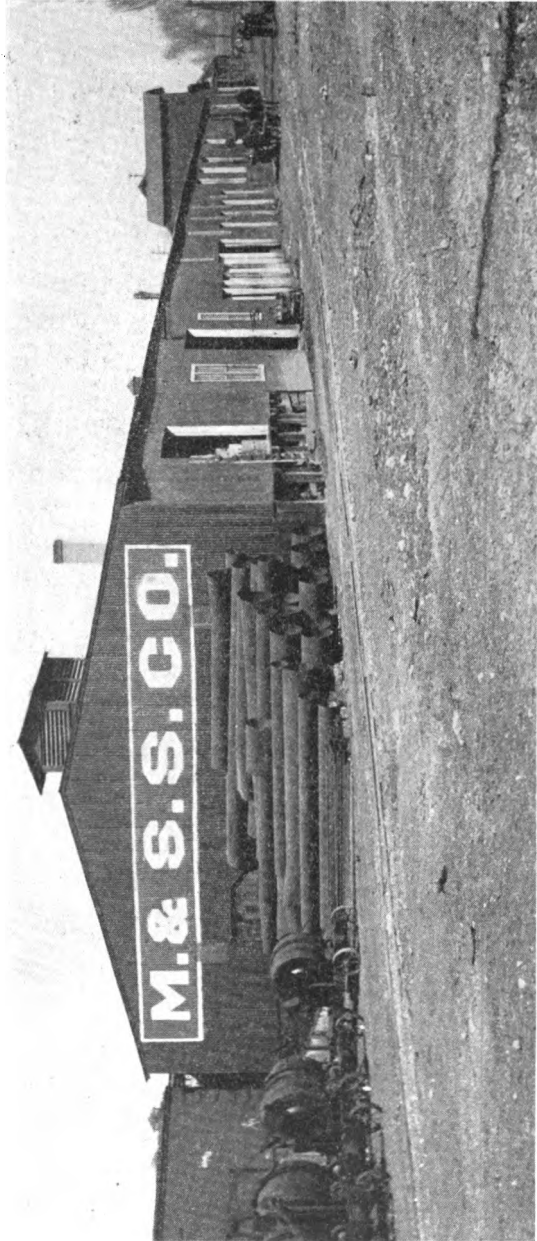
New York City, N. Y.

COPY 1917



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The Mine & Smelter Supply Co

ROY W. B.
CLUB
Y. A. S. C.



WAREHOUSE AT SALT LAKE CITY, UTAH



SAN FRANCISCO STREET, EL PASO, TEXAS



2A CALLE GANTE, CITY OF MEXICO, D. F.

TERMS

Prices in this catalogue supersede all former prices, but are necessarily subject to change without notice, as market fluctuates.

Orders from parties unknown to us should be accompanied by cash or satisfactory references.

Goods will be sent C. O. D. if requested, but only if remittance is made sufficient to cover transportation charges both ways.

Sight Draft attached to Bill of Lading on all orders for Cyanide, Mercury, Zinc Shavings, Gold and Platinum.

QUOTATIONS.

Quotations are subject to change without notice, and when made from stock are subject to sale of quoted goods on intervening orders.

DELIVERY.

Sales and delivery are subject to strikes, accidents, or other causes beyond our control.

SHIPPING.

Unless definite shipping instructions are given, we will use our own judgment, forwarding by cheapest or quickest route.

MAILING.

Acids, explosives, gasoline and other highly inflammable substances are prohibited from the mails. It is not advisable to mail fragile or delicate articles, owing to the risk of breakage.

PACKING.

All goods are packed with the greatest care by experienced packers, and every precaution is taken to prevent breakage in transit. We cannot, however, assume responsibility for safe transportation. Our liability ceases when goods are receipted for in good condition by the carrier.

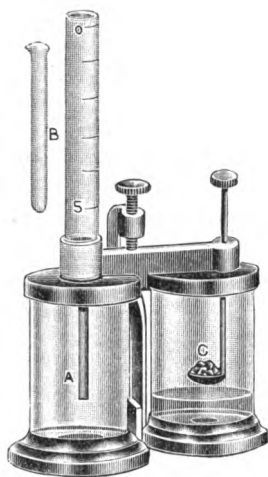
EXPORT ORDERS.

We solicit Export Orders, being thoroughly familiar with all customs regulations. Our long experience in this business enables us to prepare the necessary documents accurately, insuring our customers the quickest possible service.

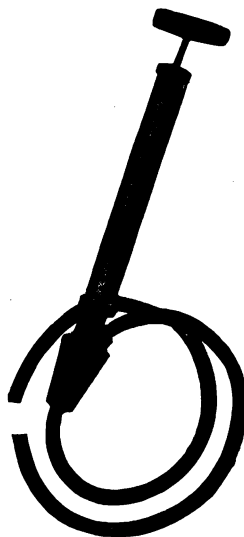
DUTY-FREE IMPORTATIONS.

By authority of Act of Congress, June 22, 1874, *all universities, colleges, schools, literary, scientific or religious societies* of the United States are permitted to import, free of duty, instruments, books, charts, etc., to be used in connection with the educational exercises of the institution for which they are ordered. We have made special arrangements in this branch of our business and shall be pleased to receive orders, which we fill at the original price of European dealers.

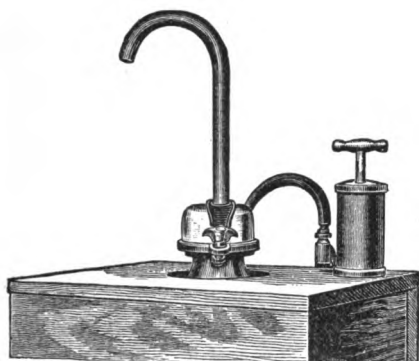
ACID PUMPS



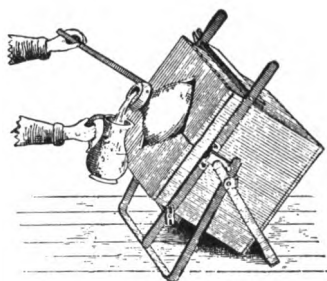
No. 200



No. 202



No. 204



No. 206

200	Acidometer, Twichell's. For determining the strength of all kinds of vinegars. Directions with each instrument, each	\$12.00
202	Acid Pump. Improved form, simple and effective, each	6.00
204	Acid Pump. For drawing acids or other liquids from carboys, very substantial and effective, for laboratory use, each	12.00
206	Acid Carboy Rocker. This support entirely prevents spilling, and the consequent danger, when carrying or tilting carboys. By this means they can be carried with ease, and any quantity drawn with safety, each.	6.00
208	Acid Pitchers. Stoneware, with handle.	
	Capacity.....pts.	2 4 8 16
	Each	\$0.30 .40 .70 1.00

AIRMETERS OR ANEMOMETERS



No. 210



No. 212

AIRMETERS AND ANEMOMETERS

Airmeters and anemometers are for the measurement of air currents in mines, tunnels, sewers, ventilation of hospitals, public buildings, etc. The indications are obtained by means of a delicately poised fan-wheel, the recordings being commenced by the long or central hand, which traverses the outer circumference of the main dial, showing the passage of 100 feet of air in a complete revolution. The enumeration can be continued to 10,000,000 feet by a series of six dials, but we strongly recommend the 4-dial instrument, reading to 100,000 feet, with a patent zero setting attachment, similar to illustration No. 210. A disconnector projects from the band of instrument, so that the mechanism can be thrown in or out of gear at the will of the user.

The usual way of taking a test is to place the instrument in the current in a number of different positions; take the number of feet that have passed during a certain time, for instance, say one minute; then divide the total by the number of readings and obtain the average; multiply that by the square of the opening or channel, and the result is the velocity of air, in feet, passing in a given time.

- | | | | |
|-----|-----|---|---------|
| 210 | (A) | Portable Airmeter, 6 dials reading to 10,000,000 feet, zero setting. | \$30.00 |
| | (B) | Portable Airmeter, 4 dials reading to 100,000 feet, zero setting. | 30.00 |
| | | J Sand Glass Timers attached, extra | 3.75 |
| 212 | (A) | Biram's, 3 inches, 2 dials, reading to 1,000 feet | 25.00 |
| | (B) | Biram's, 4 inches, 4 dials, reading to 100,000 feet | 28.00 |
| | (C) | Biram's, 6 inches, 4 dials, reading to 100,000 feet | 35.00 |

Muleback Transportation—If goods are to be packed for muleback, kindly specify so in ordering.

ALKALIMETERS



No. 214



No. 216



No. 218



No. 220

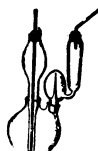
214	Alkalimeter, Bunsen's.....	\$1.00
216	Alkalimeter, Fresenius'.....	.60
218	Alkalimeter, Fresenius' and Will's.....	.45
220	Alkalimeter, Fritzsche's, for minerals.....	.50



No. 222



No. 224



No. 226



No. 228

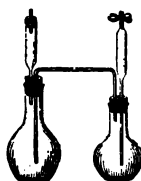
222	Alkalimeter, Geissler's, with ground joints.....	\$1.40
224	Alkalimeter, Geissler's, with stopcock.....	2.00
226	Alkalimeter, Geissler and Erdmann's.....	1.50
228	Alkalimeter, Geissler's, improved form, for one acid.....	1.75
230	Alkalimeter, Geissler's, improved form, for two acids.....	2.00



No. 232



No. 234



No. 236



No. 238

232	Alkalimeter, Kipp's, with stopcock.....	\$1.80
234	Alkalimeter, Mohr's, with pinch cock.....	.75
236	Alkalimeter, Mohr's, for carbonic acid determinations.....	1.00
238	Alkalimeter, Mohr's, with stopcock.....	2.50



No. 240



No. 242



No. 244

240	Alkalimeter, Rohrbeck's, with stopcock.....	\$1.80
242	Alkalimeter, Schroedter's, with stopcock.....	1.80
244	Alkalimeter, Schaffner's, on foot.....	.60

Amalgam Buckets. See page 106, No. 1140.

Aneriod Barometers. See pages 67 and 68.

ANNEALING CUPS



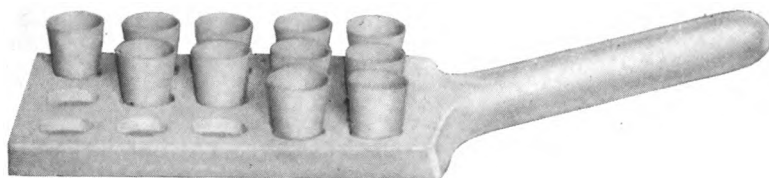
No. 248

246 Annealing Cups, Colorado.

No.....		0	1	2
Size.....inches		$1\frac{1}{8} \times 1\frac{1}{8}$	$1\frac{1}{4} \times 1\frac{1}{4}$	$1\frac{1}{2} \times 1\frac{1}{2}$
Per dozen.....		\$1.00	1.00	1.00
Covers.....per dozen		\$0.25	.25	.25

248 Annealing Cups, "Battersea."

No.....	A	B	C	D
Size.....inches	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$
Per dozen.....	\$1.00	1.00	1.00	1.00
Covers.....per dozen	\$0.25	.25	.25	.25

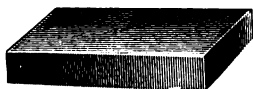


No. 250

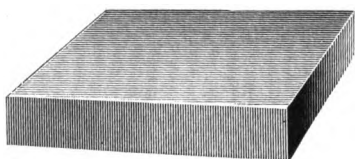
250 Annealing Cup Trays. Fire clay. A great convenience when handling annealing cups while in muffles.....each \$0.75

252 Annealing Cup Trays. Of tinned iron, with detachable wood handle; made to hold 12 porcelain cups, of either R. B. No. O or OO, or R. M. No. 7; can be made to order for other sizes.....each 1.25

ANVILS



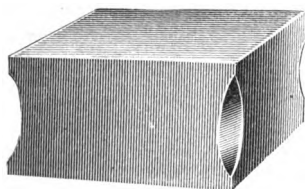
No. 254



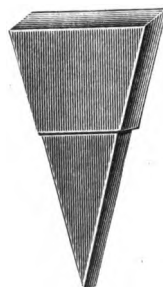
No. 256

254 Anvil, Plattner's, $1\frac{1}{2} \times 1\frac{1}{2}$ -inch, for Blow Pipe work; Polished Steel \$0.50

256 Anvil, for Lead Buttons, 6 x 6-inch, Planed on one side..... 1.00



No. 258



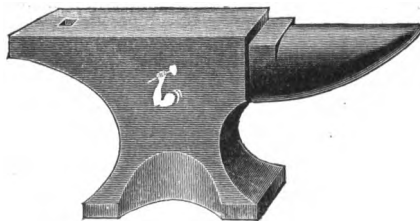
No. 260

258 Anvil, Square, Solid Steel, Mirror Polished Face.

Size.....inches	1 x 1	2 x 2	$2\frac{1}{2} \times 2\frac{1}{2}$	3 x 3
Price.....each	\$0.75	1.30	1.70	2.00

260 Anvil, Square, with Point, Solid Steel, Mirror Polished Face.

Weight.....pounds	1	2	3	4	6
Face.....inches	$1\frac{1}{2}$	$1\frac{7}{8}$	$2\frac{1}{4}$	$2\frac{5}{8}$	3
Price.....each	\$0.75	1.25	1.75	2.50	3.50

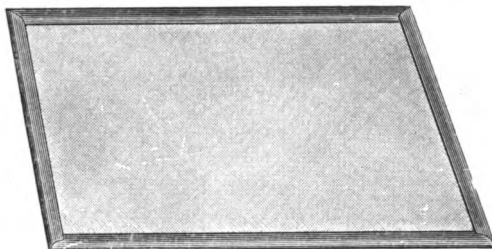


No. 262

262 Anvil, Regular Shape, Steel Face, for use on Table.

Weight.....pounds	5	10	15	20	30	50
Face.....inches	4	5	$5\frac{1}{2}$	$6\frac{1}{4}$	7	$8\frac{1}{2}$
Price.....each	\$2.20	2.75	3.25	4.00	4.75	6.25

ASBESTOS GOODS



No. 272

- 264 **Asbestos Boards**—Made from the best grade of long asbestos fibre; strictly fire and acid proof; for ovens, furnaces, etc.

In full Sheets, 40 x 40 inches.....	per pound	\$0.10				
Cut any size to order.....	per pound	.15				
Thickness.....inches	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	
Approximate Weight of full sheets.....pounds	4	8	12	15	25	30

- 266 **Asbestos Board** — Cut in squares $\frac{1}{8}$ -inch thick.

Size.....inches	4 x 4	5 x 5	6 x 6
Price.....per dozen	\$0.20	.30	.40

- 268 **Asbestos Cloth** — Strictly Pure, unaffected by fire, acids or mineral oils. Extensively used for filtering acids.

	Fine	Medium	Heavy
Approximate weight per sq. foot.....ounces	3 $\frac{1}{2}$	4 $\frac{3}{8}$	6 $\frac{1}{4}$
Width.....inches	36	36	36
Price.....per yard	\$3.50	4.00	5.50

- 270 **Asbestos Cord** — For Suspending Metals, Crucibles, Retorts, etc., in contact with fire; in 1-pound balls, about $\frac{1}{8}$ -inch in diameter.

Price.....per pound	\$1.00
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Asbestos Fibre. See Chemical List, page 484.

Asbestos Gloves and Mittens. See page 261, Nos. 2354-2356.

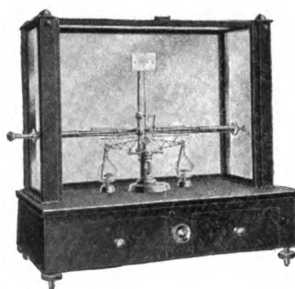
- 272 **Asbestos Pads** — For protecting the table during blow pipe or soldering operations. They are made from Asbestos board about one-fourth of an inch thick, and edged with iron. They are incombustible, and excellent non-conductors of heat. The advantages to be derived by their use are too obvious to need further explanation.

Size.....inches	4x4x $\frac{1}{4}$	8x8x $\frac{1}{4}$	6 $\frac{1}{2}$ x10x $\frac{1}{4}$	10x13x $\frac{1}{4}$	13x20x $\frac{1}{4}$
Price.....each	\$0.15	0.40	0.50	0.85	1.50

- 274 **Asbestos Paper** — Made of pure, white, long-fibred Asbestos, 36 inches wide, 1 yard weighing 1 pound.....per pound \$0.15
In 10-pound lots.....per pound .12



HIGHEST AWARD



“HEUSSER” BALANCE

“A Blue Ribbon Winner”

AWARDED

THE FIRST GRAND PRIZE

FOR

ASSAY BALANCES

AT

THE ALASKA YUKON PACIFIC
EXPOSITION

SEATTLE, 1909

MANUFACTURED EXCLUSIVELY FOR

THE MINE AND SMELTER
SUPPLY CO.

HEUSSER BALANCES

Manufactured exclusively for The Mine and Smelter Supply Co.

The selection of a fine assay balance requires that more than one feature, namely sensibility, be considered. There is no single point in any balance that makes it perfect, while all parts collectively are what comprise an instrument that is permanently accurate, stable in adjustment, and adapted to all climatic conditions.

In the building of the "Heusser Balances" each single feature has been so designed and constructed that standing alone, it would make the balance a desirable one to purchase, and in the whole, we offer what we know to be the most reliable line of balances made.

BEARINGS

Special attention has been given to the grinding and setting of the edges, or bearings, which is the first principle of balance construction. Nothing but the finest "Cornelian Agate" is used throughout, the principal being a flat surface on a knife edge which allows the very minimum of friction, thereby increasing the speed and sensibility; all bearings are relieved when the balance is at rest.

BEAMS

Our beams are constructed of solid rolled brass heavily gold-plated. The style on our Type 1000 balance being a perfect mathematical truss which allows the minimum amount of weight, retaining the greatest rigidity; such a beam is absolutely necessary where extreme accuracy, speed and sensibility are essential. Through this construction, we have reduced the time of oscillation to less than "thirteen seconds," which is remarkable in balances even less sensitive. In our other types, namely 2000, 2000-B, 3000 and "Special Mint," being less sensitive, they permit the use of a heavier beam which is of the same dimensions, carefully drilled, and adjusted perfectly for the sensibility required. The distance between the outer knife edges is 5 inches on all beams, and the upright pointer, or index, 5 inches long. Star wheels are provided for adjustment.

RIDER DEVICE

In our rider attachment we have endeavored to construct it to reduce the time of operating the balance to a minimum. The position of the rider on the beam is indicated by the means of a white celluloid scale, mounted behind the beam, with sharp black graduations upon it. The pointer is of the same material, perfectly coinciding with these graduations on the scale, which greatly facilitates the reading, and is not so tiresome on the eyes. The rider scale is divided into one hundred parts, for one milligram rider ten divisions corresponding to one-tenth milligram.

HEUSSER BALANCES

RIDER LOCK

Our Types 1000, 2000, 2000-B, and "Special Mint" are all provided with a rider lock, which is attached to the main column, the intention being to have a means of locking your rider on the hook to protect it from becoming unseated, when the balance is not in use.

RAISING AND LOWERING DEVICE

The raising and lowering mechanism of these balances is of absolutely perfect construction, being designed to allow no swing to the beam upon releasing same, and is provided with patent permanent lubrication. They are mounted on a solid black glass plate, which extends to the outline of the case; all metal work above this base is heavily gold-plated.

PAN HANGERS AND PANS

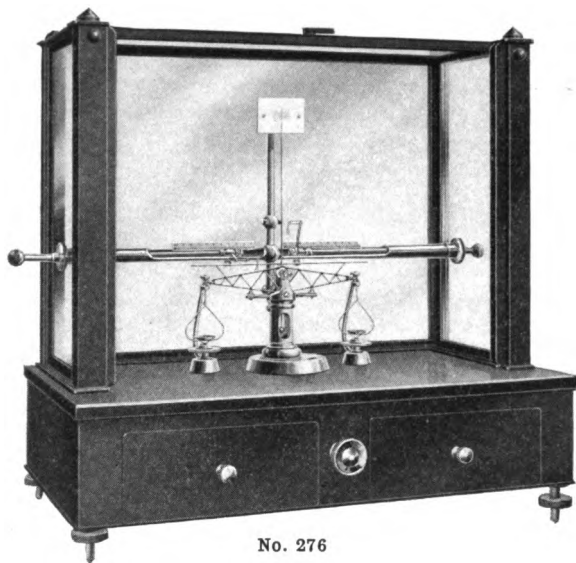
The pan hangers bear upon knife edges by jeweled bearings which are brought to place at each lowering of the beam. The pans are of silver, oxidized inside, so that the least particle of dust can be easily detected. The beam and pan hangers are the only parts removed for shipping, which greatly simplifies the setting up of the balance.

CASE

One of the striking and practical features of our instrument is the construction of the case, which is of brass oxidized, and heavily lacquered, making it impervious to all laboratory fumes, and will not corrode. It is known that a wooden case is not satisfactory under all conditions, being greatly affected by climatic changes, either shrinking or swelling, as the case may be. Therefore it cannot be dustproof or work satisfactorily under these conditions. This is not true with ours. Its construction renders it absolutely non-warpable and unaffected by all climatic changes. It is as nearly dustproof and airtight as is practical; the door slides smoothly in pressed oil board channels and is on a perfect counterpoise. The sheave wheels are set in paraffined wood, which furnishes permanent lubrication. Owing to the metal construction of the case it admits an unusual amount of light, and is, furthermore, of considerable protection against disturbing electrical influences. Regardless of it being in a metal case, the balance, complete, is comparatively light, weighing only 20 pounds.

Remember our balance was awarded the "First Grand Prize," a "blue ribbon," at the Alaska-Yukon-Pacific Exposition. This was the very "highest award" and given after a thorough test. We guarantee our entire line to give perfect satisfaction, according to their various ratings and sensibilities. If they fail after fifteen days trial they can be returned and we will cheerfully refund your money. We recognize No EQUAL in the balance line, and invite comparison at all times. If you are interested we will supply, upon request, enlarged original photographs of every type, to enable you to study in detail the construction of each balance.

HEUSSER BALANCES



No. 276

HEUSSER BUTTON BALANCE, TYPE 1000

Sensitive to 1-500 Mg.

This balance is perfectly constructed and in every feature the result of highest class workmanship. It is acknowledged by leading assayers as the best instrument of its kind ever manufactured. For the comparatively short time it has been on the market it has made an enviable record and in competitive tests has proven its superior qualities beyond doubt.

The features that go to make up this splendid instrument are **rapidity of weighing, facility of reading, stability of adjustment and great ease of manipulation.**

A new departure, you will note, in the manufacture of our balances, is the metal case, which affords absolute guarantee to maintain its form and permit smooth working under all atmospheric conditions, prohibiting it from warping, shrinking, or swelling, being permanently rigid, which aids materially in retaining its adjustment.

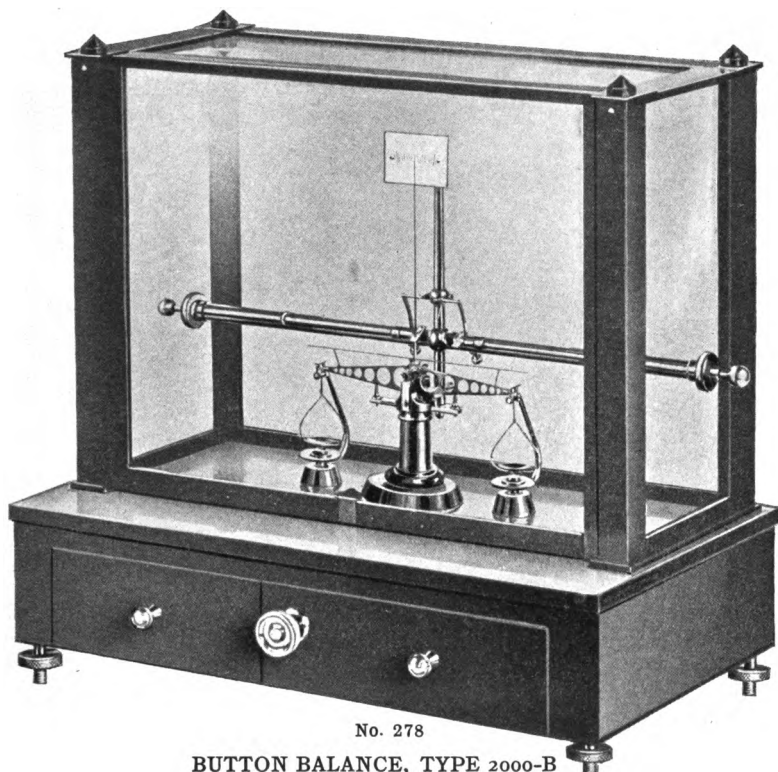
Contrary to general opinion, the case is unaffected by electrical disturbances, many users claiming that they find it a protection against electrical influences. The beam is hand cut and finished, heavily gold plated, and a perfect mathematical truss, allowing the minimum amount of weight and inertia for the required rigidity, thus reducing the time of oscillation to less than 13 seconds.

Price.....Net, \$300.00

We pack it in a felt padded box simple in construction, requiring only a moment to unpack and set the instrument up in working order.

Net weight 20 pounds (9.1 kilos), shipping weight 34 pounds (15.5 kilos). Dimensions packed for shipping: 17½ inches (44.5 cm.) by 10½ inches (26 cm.) by 16½ inches (42.5 cm.).

HEUSSER BALANCES



No. 278

BUTTON BALANCE, TYPE 2000-B

Also known as the Universal Balance
Three Sensibilities. 1-100, 1-250, 1-500

In this balance we have to offer a most practical and accurate one, built in duplicate of type 1000 with the exception of the beam, which is drilled instead of hand cut. However, the adjustment of this beam is perfect and although it is rated with an initial sensibility of 1-100 mg. it is capable of accepting the sensibility of 1-250 or 1-500 mg. This change is accomplished instantaneously by our patented idea of raising or lowering the center of gravity at will. Unquestionably for an all around assay balance it is superior to any.

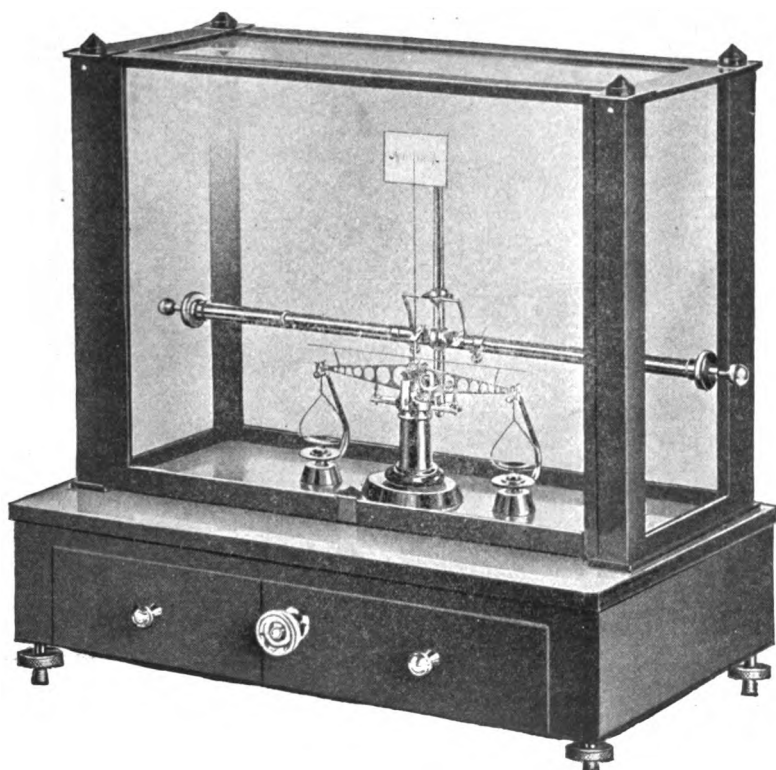
Price..... net, \$250.00

THE UNIVERSAL ASSAY BALANCE

Grade of Sensibility	Pointer Deflection in div. for 1-10 mg.	Value in Gold for 1 div. pointer defect.	Value in mg. for 1 div. pointer defect.
1-100	1	\$2.00	10-100
1-250	2.5	.80	4-100
1-500	5	.40	2-100
Ratio of Rider Bar Divisions to one Division on Index Scale		Time of Oscillation	
10		7	
4		11	
2		14	

This balance is packed in a felt padded box, simple of construction, requiring but a moment to unpack, and set the instrument in working order.

HEUSSER BALANCES



No. 280

BUTTON BALANCE, TYPE 2000

Sensitive to 1-250 Mg.

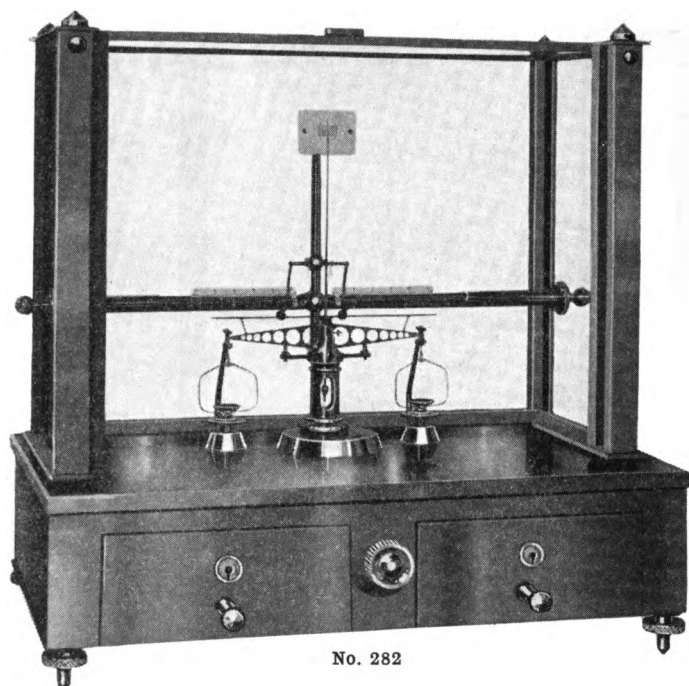
With the exception of the beam, the balance is identical with the No. 1000 type. The sensibility of 1-250 mg. is chosen in order that four divisions on the rider scale may correspond to one division on the index scale. The beam furnished with this instrument is of perfect construction, the only difference being that it is drilled rather than hand cut, the reduced sensitiveness not requiring the truss beam.

The balance is packed in felt padded box, simple of construction, requiring but a moment to unpack, and set the instrument in working order.

Price.....Net \$225.00

The net weight is 20 pounds (9.1 kilos). Gross shipping weight, 34 pounds, (15.5 kilos). The dimensions packed for shipping are: $17\frac{1}{2}$ inches (44.5 cm.) by $10\frac{1}{2}$ inches (26 cm.) by $16\frac{1}{2}$ inches (42.5 cm.).

HEUSSER BALANCES



BUTTON BALANCE, MINT TYPE

Sensitive to 1-200 Mg

Constructed in exact design of our Types 2000 and 2000-B, yet to conform to the ideas and requirements of the United States Assay Offices and mints. We have equipped this balance with the enlarged pan hangers to aid the handling of larger buttons in weighing, which is necessary in the work at these offices. The rider bar is especially graduated 0 to 5 instead of 0 to 10, this being designed especially according to the government system of weights used in their work. It is equally practical in mine work where these features appeal to the user.

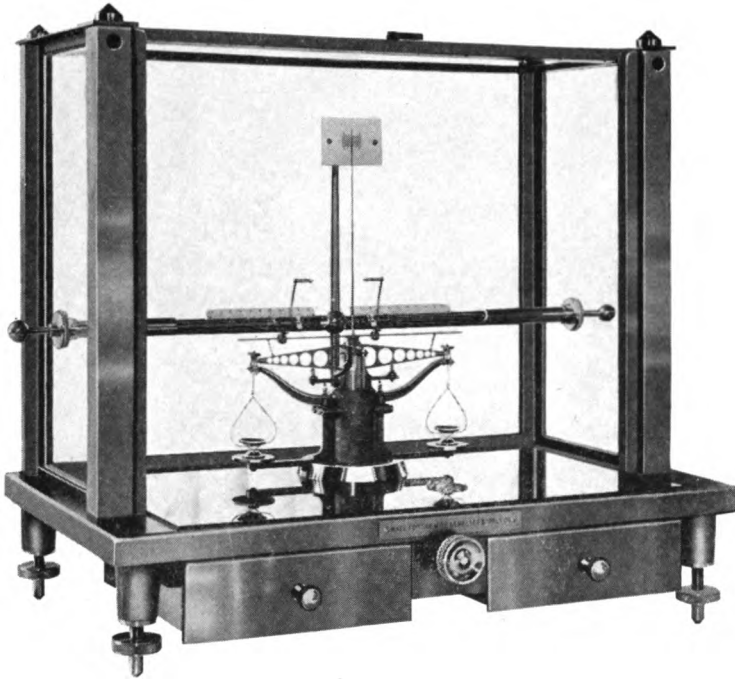
This balance is provided with locks on each drawer as means of protection to their contents.

Price.....Net, \$225.00

This balance is packed in a felt padded box, simple of construction, requiring but a moment to unpack and set the instrument in working order.

The net weight is 20 pounds (9.1 kilos.) Gross shipping weight 34 pounds (15.5 kilos.) The dimensions, packed for shipping, are: $17\frac{1}{2}$ in. (44.5 cm.) by $10\frac{1}{2}$ in. (26 cm.) by $16\frac{1}{2}$ in. (42.5 cm.).

HEUSSER BALANCES



No. 284

HEUSSER BUTTON BALANCE, TYPE 3000

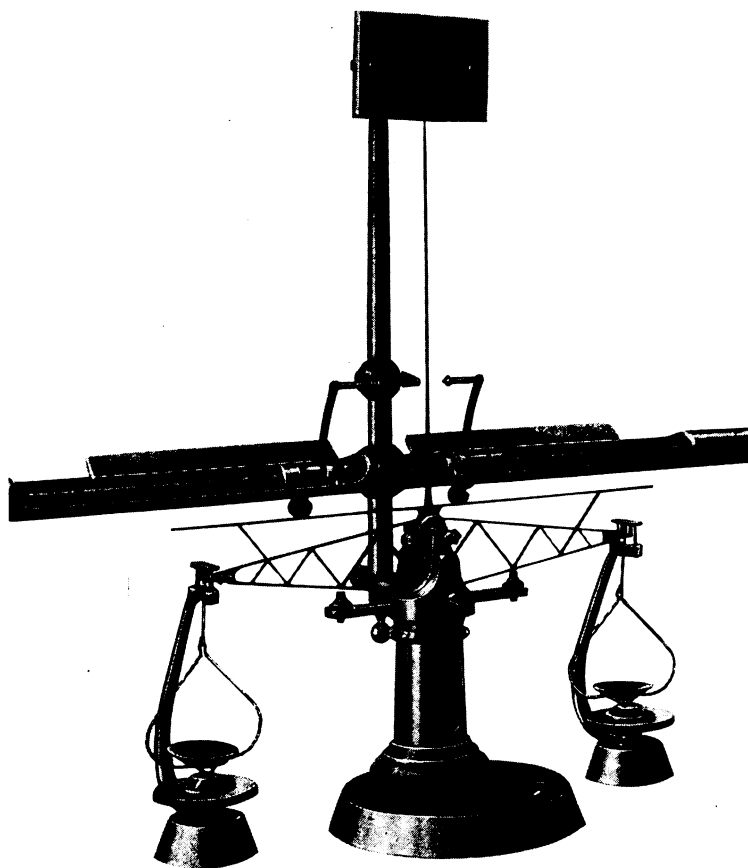
Sensitive to 1-100 MG.

To supply the demand of a high grade balance of a lesser sensibility we have been prompted to build Type 3000, which in beam and rider attachment is a duplicate of our Type 2000. We have departed slightly in the general construction making our base of a solid casting with the glass plate countersunk and covering to the inner dimensions of the case. Owing to the open construction of this base, all working parts and raising and lowering device are above it, and enclosed in the main case as protection against dust, etc. Every part is designed with the same care as our finest balances and a guarantee of satisfaction given with every instrument.

Price.....Net, \$150.00

This balance is packed in a felt padded box simple of construction requiring but a moment to unpack and set the instrument up in working order.

The net weight is 21 pounds, or 9.5 kilos. Gross shipping weight, 32 pounds, or 14.5 kilos. The dimensions packed for shipping are: 17¼ ins. (40 cm.), by 9¾ ins. (20 cm.), by 15¾ ins. (16.5 cm.).

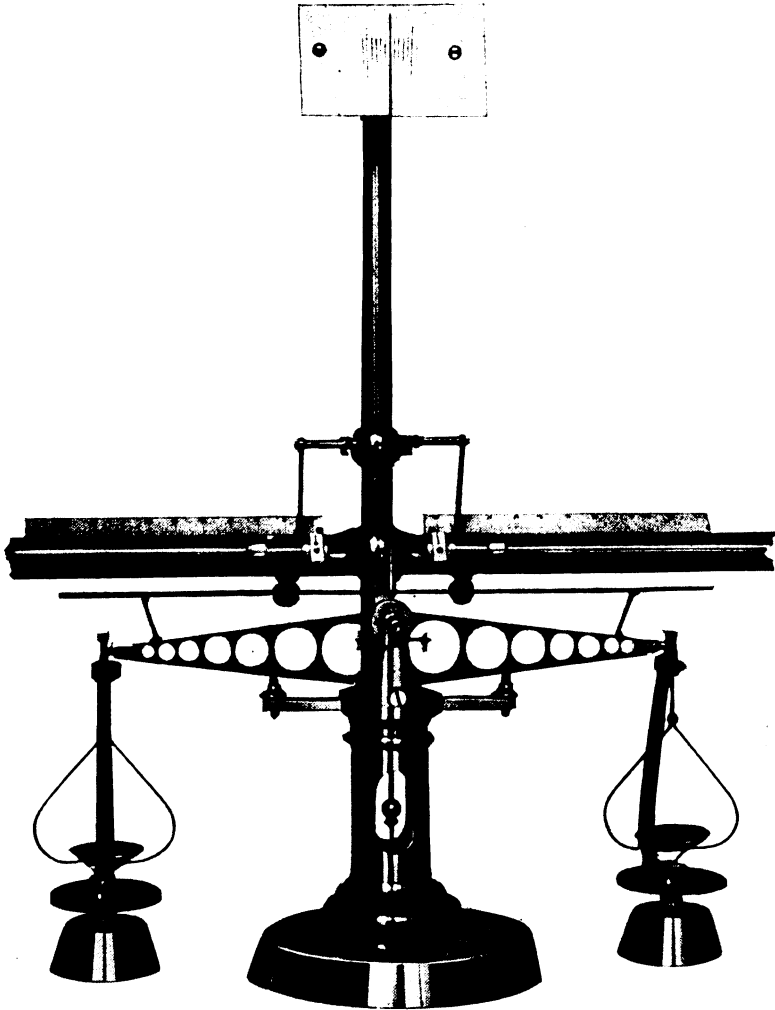
HEUSSER BALANCES**No. 286****BEAM, POINTER INDEX AND RIDER DEVICE ON BUTTON BALANCE,****TYPE 1000**

In the above we call your attention to the rider device, index and pan hangers. All plainly shown and giving a more detailed idea of the construction of the actual working parts of our balance.

It also shows the star-wheels on the beam used in final adjustment and the thumb screws that regulate the tension of the rider arm.

In this cut note the perfect construction of the truss beam and also the sharp black graduations on the reading device, etched in the whitest celluloid. The pointer index being graduated the same. The indicator here is at zero.

HEUSSER BALANCES



No. 288

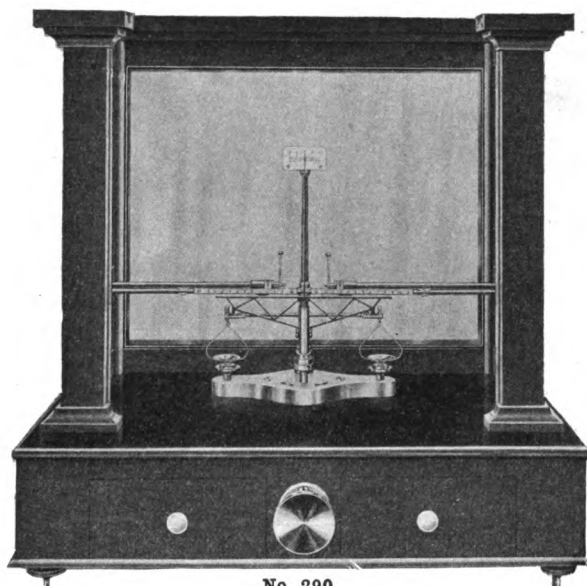
**BEAM, POINTER INDEX AND RIDER DEVICE OF HEUSSER BUTTON BALANCES,
TYPES 2000, 2000B, 3000 AND SPECIAL MINT**

We call attention here to the beam and rider lock, all other points being a duplicate of type 1000 shown and described on previous page. In our balance of the lesser sensibilities it is not essential to have the finely made truss beam, therefore we furnish the same size carefully drilled and accurately adjusted.

The rider lock is provided to protect the rider from becoming unseated when the balance is not in use, the principle being a ball attachment on the main column, on which is an extended arm with socket into which the rider arm locks. With this device your rider is always to be found in place.

BALANCES

AINSWORTH'S



No. 290

BUTTON BALANCE, INVERTED TYPE V

5-inch Beam. Sensibility 1-200 to 1-500 Mg.

290 This balance embodies the latest improvements in inverted type balances and is adjusted at a sensibility of 1-500 milligramme, and afterwards reduced to 1-200 milligramme to increase the rapidity of vibration.

All metal work heavily gold-plated and lacquered.

Dimensions of case, 17 x 17 x 10 inches. Packed, 23 x 22 x 15 inches, 4.5 cu. feet.

Weight net, 20 pounds. Packed, 45 pounds; packed in zinc-lined case for export, 60 pounds.

Price..... each \$300.00

BUTTON BALANCE, TYPE VB

5-inch Beam. Sensibility 1-200 Mg.

292 With improved multiple rider carrier. This balance is similar to the Type V, described above, excepting that it is not provided with releasing mechanism for the end bearings, which are grooved, instead of agate planes. All metal work heavily plated. Dimensions of case, weight, etc., are the same as Type V.

Price, with Multiple Rider Carrier..... each \$285.00

Price, without Multiple Rider Carrier..... each 250.00

BUTTON BALANCE, TYPE VC

5-inch Beam. Sensibility 1-100 Mg.

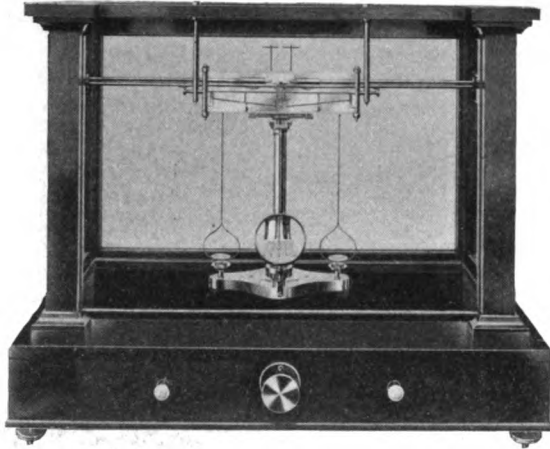
294 A moderate priced inverted type balance, suitable for general work where the greatest accuracy is not required. This balance is similar to Type VB, described above, excepting that it has a heavy brass beam and will carry a heavier load. All metal work heavily gold-plated. Dimensions, weight, etc., same as for Type V.

Price..... each \$175.00

Note—We are prepared to quote prices for duty-free importation on all classes of balances for educational institutions.

BALANCES

AINSWORTH'S



No. 296

BUTTON BALANCE, TYPE A

5-inch Beam. Sensibility 1-200 (.005) Mg.

296 For accurate and rapid weighing, and used by many assayers having a large volume of work.

The beam is of brass, straight on top and with 50 divisions each side of the center reading to 1-50 milligramme with a 1 milligramme rider, or to 1-100 milligramme with a ½-milligramme rider, finer readings being taken by subdividing the divisions with the eye, a specially ground reading glass being provided. The beam is unobstructed on top, and a rider may be placed anywhere from 0 at the center to the last division at either end, which is directly over the end edge and represents the full weight of the rider used.

All edges and bearings are of agate. Has fall-away pan-rests, improved base, rider apparatus and releasing mechanism, plate-glass sub-base and skeleton hangers. In French polished mahogany case with counterpoised sliding door. Dimensions, 20 x 17 x 10 inches.

Weight, net, 20 pounds. Packed, 50 pounds. Packed for export in zinc-lined case, 60 pounds.

Dimensions, 27 x 21 x 15 inches.

Price..... \$250.00

BUTTON BALANCE, TYPE E

5-inch Beam. Sensibility 1-200 Mg.

298 This balance is similar in all respects to Type A, but is not provided with reading glass for beam, nor improved base.

Has all latest improvements, including improved rider apparatus, star-wheel adjustment, skeleton hangers, plate-glass sub-base, agate edges and bearings, etc.

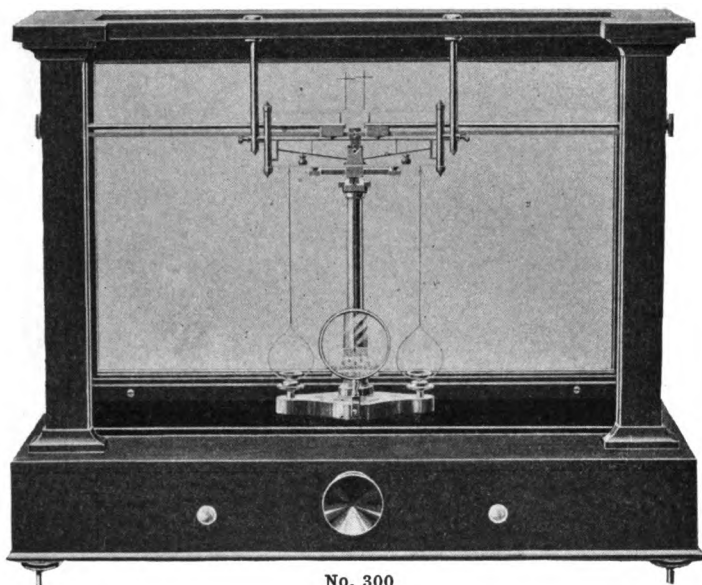
Case is of thoroughly seasoned mahogany, with counterpoised sliding door.

Dimensions, 20 x 17 x 10 inches.

Weight, net, 20 pounds. Packed, 50 pounds. Packed for export in zinc-lined case, 60 pounds.

Dimensions, 27 x 21 x 15 inches.

Price..... \$225.00

BALANCES**AINSWORTH'S**

No. 300

BUTTON BALANCE, TYPE F

4-inch Beam. Sensibility 1-200 (.005) Mg.

300 This balance, having a beam but four inches long, is very rapid and has all the latest improvements, including reading glass for beam, improved rider apparatus and base, fall-away pan-rests, plate-glass sub-base, skeleton hangers.

The beam has 50 divisions each side of the center reading to 1-50 milligramme with a 1 milligramme rider or to 1-100 milligramme with a $\frac{1}{2}$ milligramme rider, finer readings being taken by subdividing the divisions with the eye. It is unobstructed on the top, and the rider can be placed at any point from the 0 at the center to the last division at either end, which is directly over the end edge and represents the full weight of the rider used. All edges and bearings are of agate.

Has French polished mahogany case with counterpoised sliding door, all of thoroughly seasoned lumber.

Dimensions, 20 x 17 x 10 inches.

Weight, net, 20 pounds. Packed, 50 pounds. Packed for export in zinc-lined case, 60 pounds.

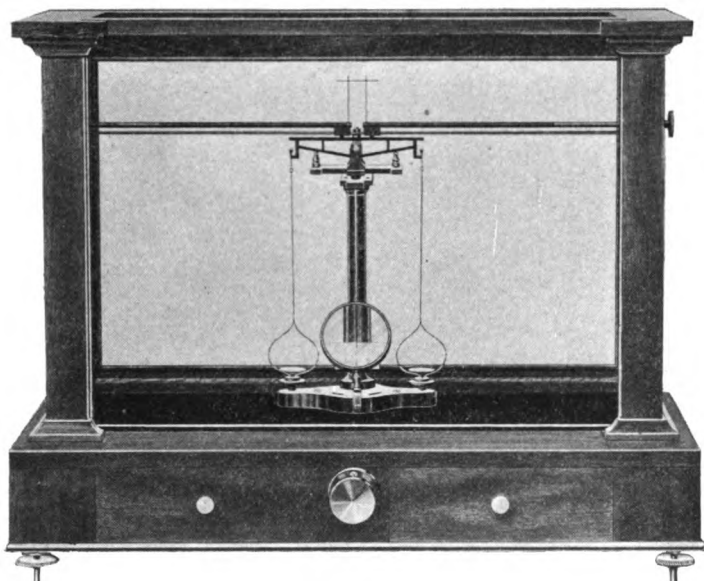
Dimensions, 27 x 21 x 15 inches.

Price..... \$250.00

BUTTON BALANCE, TYPE FA

302 Similar in all respects to the Type F, described above, except that it has no reading glass for beam.

Price..... \$225.00

BALANCES**AINSWORTH'S****No. 304****BUTTON BALANCE, TYPE FB**

4-inch Beam. Sensibility 1-100 Mg.

304 This balance has heavy 4-inch beam and is suitable for accurate and rapid gold and silver button weighing.

It has all latest improvements, including fall-away pan-rests, agate edges and bearings, skeleton hangers, double rider apparatus, unit base construction plate-glass sub-base, reading glass for index, etc.

Dimensions, 20 x 17 x 10 inches.

In the engraving the sliding door has been removed to better illustrate the balance.

Weight, net, 20 pounds. Packed, 50 pounds. Packed for export in zinc-lined case, 60 pounds.

Dimensions, 27 x 21 x 15 inches.

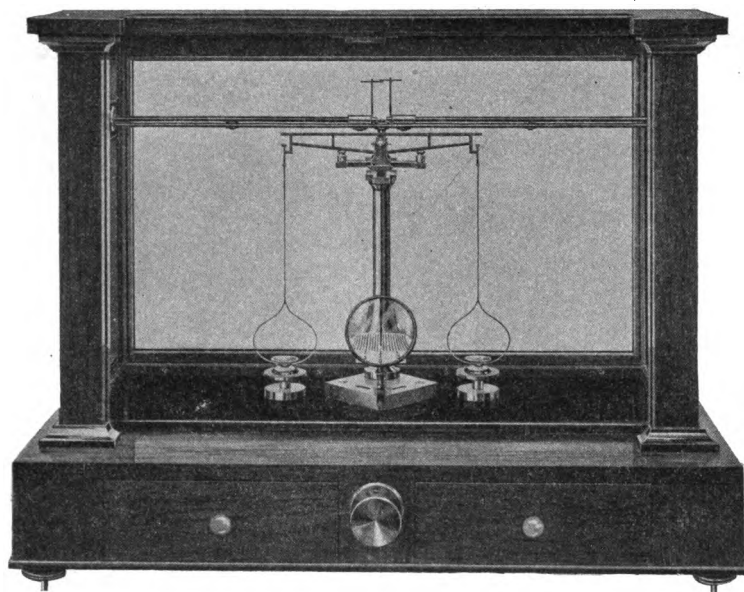
Price..... \$160.00

BUTTON BALANCE, TYPE EA

5-inch Beam. Sensibility 1-100 Mg.

306 Similar in construction to Type FB, except in length of beam and unit base, which it does not have.

Price..... \$160.00

BALANCES**AINSWORTH'S****No. 308****BUTTON BALANCE, TYPE H****6-inch Beam. Sensibility 1-100 (.01) Mg.**

308 An excellent button balance for ordinary button weighings with all the latest improvements, including improved rider apparatus and fall-away pan-rests. Has agate edges and bearings and star-wheel adjustment.

The beam has 50 divisions each side of the center reading to 1-50 milligramme with a 1 milligramme rider, or to 1-100 milligramme with a $\frac{1}{2}$ milligramme rider, and being unobstructed on the top, the rider may be placed at any point from 0 at the center to the last division, which is directly over the end edge and represents the full weight of the rider used.

Has French polished mahogany case of thoroughly seasoned mahogany, with counterpoised sliding door and plate-glass sub-base.

Dimensions, 20 x 17 x 10 inches.

Weight, net, 20 pounds. Packed, 50 pounds. Packed for export in zinc-lined case, 60 pounds.

Dimensions, 27 x 21 x 15 inches.

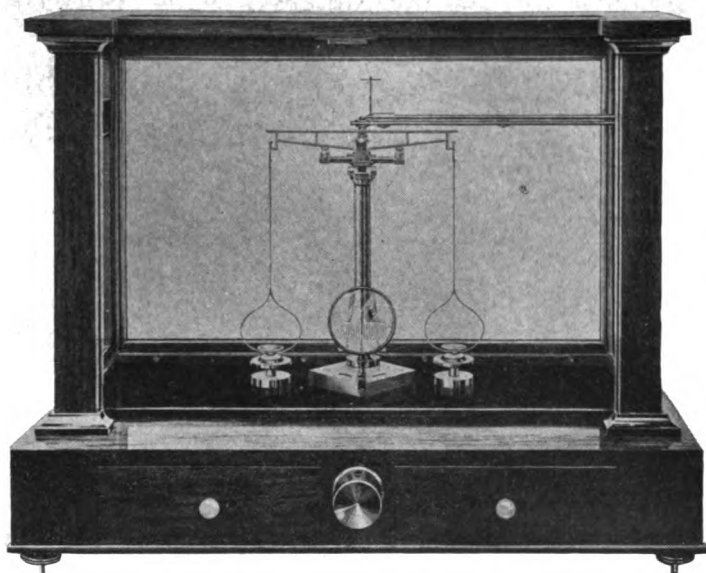
Price..... \$135.00

BUTTON BALANCE, TYPE I**8-inch Beam. Sensibility 1-50 (.02) Mg.**

310 Similar to Type H, described above, only slower, owing to the difference in length of beam (2 inches).

Dimensions, 27 x 21 x 15 inches.

Price..... \$125.00

BALANCES**AINSWORTH'S****No. 312****BUTTON BALANCE, TYPE J**

6-inch Beam. Sensibility 1-50 (.02) Mg.

312 This balance is similar to Type H, excepting the beam, which is graduated and provided with rider apparatus on right hand side only and adjusted to a sensibility of 1-50 milligramme. Has latest improved rider apparatus, agate bearings and edges, plate-glass sub-base, fall-away pan-rests, etc. In French polished mahogany case, with counter-poised sliding door.

Dimensions, 20 x 17 x 10 inches.

Weight, net, 20 pounds. Packed, 50 pounds. Packed for export in zinc-lined case, 60 pounds.

Dimensions, 27 x 21 x 15 inches.

Price..... \$125.00

BUTTON BALANCE, TYPE K

8-inch. Sensibility 1-50 (.02) Mg.

314 Similar to Type J, described above, only slower, owing to the difference in length of beam (2 inches).

Dimensions, 27 x 21 x 15 inches.

Price..... \$115.00

BALANCES

AINSWORTH'S



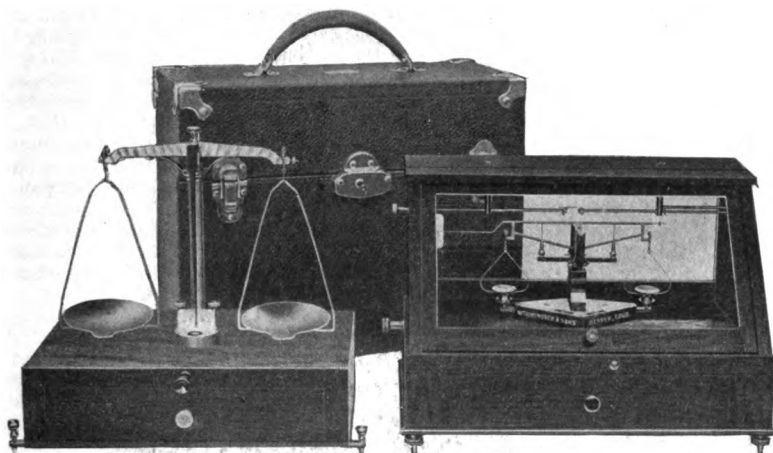
No. 316

PORTABLE BUTTON BALANCE, TYPE RA

5-inch Beam. Sensibility 1-100 Mg.

316 A compact and accurate balance with agate edges and bearings, fall-away pan-rests, levels and leveling screws, double rider carrier and locking device, holding beam rigidly in position during transportation. Case of mahogany, French polished, with sliding door and lock for locking at any point.

Price, with Leatherette Carrying Case, as shown..... \$85.00



No. 318

PORTABLE OUTFIT, TYPES RA AND N

Comprising Type RA, as above, and Type N Pulp Balance (sensibility 1 Mg.).

318 This makes a very compact and convenient outfit, both balances together with the weights carried in a single carrying case as shown.

Price, with Leatherette Case, as shown..... \$100.00

Weights Extra.

Price, Set Platinum Button Weights, 1 Gramme to 1 Mg. and 2 Riders for above

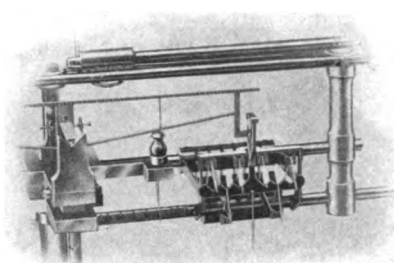
10.00

Price, Set Assay Ton Weights, 1 A. T. to 1-20 A. T. for above.....

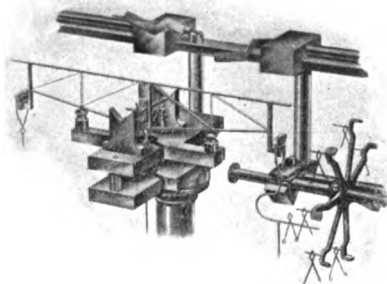
4.00

BALANCES

MULTIPLE RIDER ATTACHMENTS



No. 320
AINSWORTH'S



No. 322
THOMPSON'S

AINSWORTH'S IMPROVED MULTIPLE RIDER

320 The above illustration shows Ainsworth's Improved Multiple Rider Carrier, as adapted to button balances, for weighing without the use of the ordinary weights as used in the pan.

The riders maintain their original accuracy even after months of constant use, and not being subjected to the continual handling with tweezers, do not become bent or broken.

Each rider is carried on a separate arm a short distance above the bar on the stirrup and it is only necessary to move the number on the lower rod until it stands opposite the index pointer, and then revolve the rod slightly, which transfers the rider from the arm to the stirrup.

Each rider has its individual arm for manipulating and cannot become misplaced, thereby causing an error in the following weighing.

Buttons weighing up to 42 milligrammes can be weighed with the regular carrier and for larger capacities additional arms may be added.

When weighing a button at or near the capacity of the carrier, all of the riders may be shifted to the stirrup simultaneously, and those not needed transferred back to their respective arms. The figures on the front of arms down indicating the combined weight of the riders on the stirrups.

Price attached to new balance when ordered.....\$35.00

Price attached to old balance..... 40.00

THOMPSON'S MULTIPLE RIDER ATTACHMENT

322 This attachment and the riders used in connection with it take the place of all flat weights on button balances for weighing up to 72 milligrammes, and on analytical balances up to 720 milligrammes. The attachment is very simple, being operated from the outside of the balance case. It consists of a movable wheel or carrier with seven arms, each arm carrying a rider of different weight.

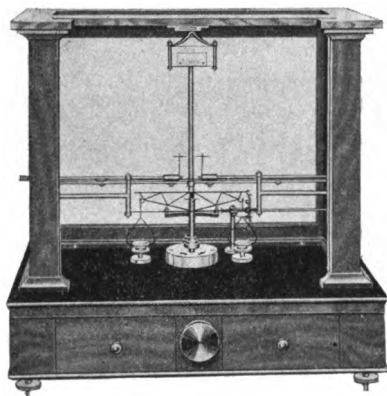
On button balances the riders used are 1, 2, 3, 5, 10, 20 and 30 milligrammes, and on analytical balances 10, 20, 30, 50, 100, 200 and 300 milligrammes. The end of each rider is formed to indicate its weight.

Price if attached to new balance or old Thompson Balance.....\$25.00

Price if attached to other makes..... 30.00

BALANCES

THOMPSON'S



No. 324

BUTTON BALANCE, STYLE No. 5

5-inch Beam. Sensibility 1-500 Mg.

324 This balance is designed and built for the most delicate assaying, and has advantages of superior durability and extreme accuracy. It is of the non-column type, with upright pointer. This principle of construction gives plenty of room for a long pointer, plainly indicating the slightest movement of the beam and greatly reducing the length and weight of hangers, thereby tending to concentrate the movable mass near its central axis, and so creating the greatest possible stability of poise with the least possible resistance to the most minute load in the pan.

The scientific construction of the beam will appeal to the engineer. It is of the truss type and is so constructed that all trusses are in tension, the lower chord alone being in compression.

Special attention is called to the fact that the graduations are on the beam. In this balance we use an etching process, which in no way affects the density of the metal, and the readings being taken direct from the position of the rider on the beam, there is no possibility of error through any difference between the relative position of the rider and the graduations.

The agate edges and bearings are of the finest quality and workmanship, and in this balance we spare no time or expense in bringing the various adjustments to the highest point of perfection.

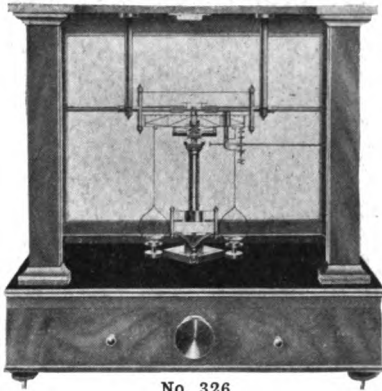
The rider apparatus, having fine felt bearings in contact with polished metal surfaces, gives a smooth and noiseless action, and is very sensitive to the touch.

The balance has a star wheel balancing device, skeleton hangers, fall-away pan-rests, rider rod locks, levels and leveling screws. The beam and index are provided with special ground cylindrical reading glasses, and all exposed metal parts are gold plated.

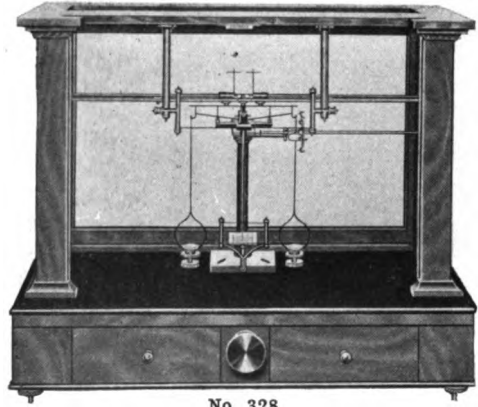
The case is of mahogany, thoroughly seasoned and finely polished, and has counter-poised door. A black glass-plate extends over the entire base.

Dimensions of case, $16\frac{1}{2}$ x 17 x 10 inches.

Price, as illustrated and described	\$350.00
Price, without Multiple Rider Attachment	325.00
Price, without Reading Glass for Beam and without Attachment	310.00

BALANCES**THOMPSON'S**

No. 326



No. 328

BUTTON BALANCE, No. 6

4-inch Beam. Sensibility 1-400 Mg.

326 We recommend this balance for work requiring extreme accuracy, such as control and umpire assays. It is quick and positive in action and has a stability of poise that will insure uniform and reliable results. Edges and bearings are of selected agate ground and polished with the greatest care.

The balance has improved rider apparatus, star wheel balancing device, specially ground reading glasses for beam and index, skeleton hangers, fall-away pan-rests, rider rod lock, levels and leveling screws.

The case is of thoroughly seasoned mahogany, with counterpoised sliding door. It is finely polished and has a black plate-glass which extends over the entire base.

Size of case, $16\frac{1}{2} \times 17 \times 10$ inches.

Price, as illustrated and described..... \$325.00

Price, without Multiple Rider Attachment..... 300.00

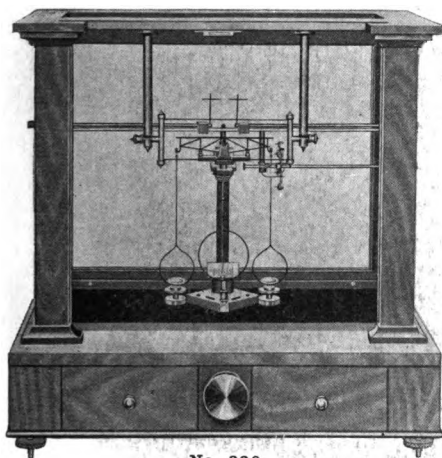
BUTTON BALANCE, STYLE No. 8

5-inch Beam. Sensibility 1-400 Mg.

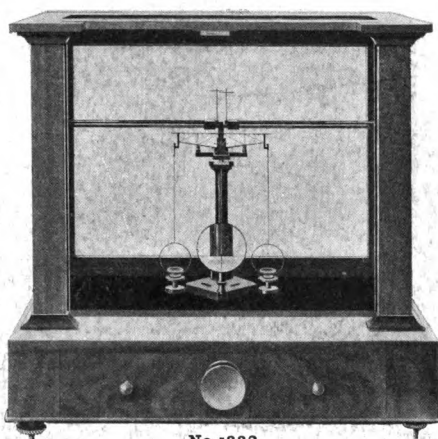
328 Similar in construction to Style No. 6, excepting the beam, which is 1 inch longer, and of plain construction without braces or pin graduations.

Price, as described..... \$290.00

Price, without Multiple Rider Attachment..... 265.00

BALANCES**THOMPSON'S**

No. 330



No. 1332

BUTTON BALANCE, STYLE No. 7

4-inch Beam. Sensibility 1-200 Mg.

330 Has agate edges and bearings, truss beam with pin graduations, double rider attachment, fall-away pan-rests, star wheel balancing device, skeleton hangers, rider rod locks, reading glasses for beam and index. Mahogany case with plate-glass base, levels and leveling screws.

Dimensions, $16\frac{1}{2} \times 17 \times 10$ inches.

Price, as illustrated and described. \$275.00

Price, without Multiple Rider Attachment. 250.00

If preferred, we will furnish at same price a rectangular reading glass for beam instead of the round glass shown in illustration.

BUTTON BALANCE, STYLE No. 9

4-inch Beam. Sensibility 1-200 Mg.

332 Same in all respects as Style No. 7, except that this style has no magnifying glass for beam.

Price, as illustrated and described. \$235.00

Price, with Multiple Rider Attachment. 260.00

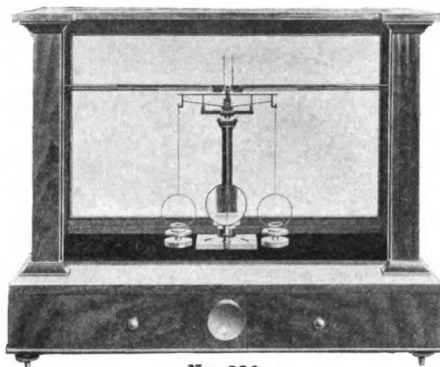
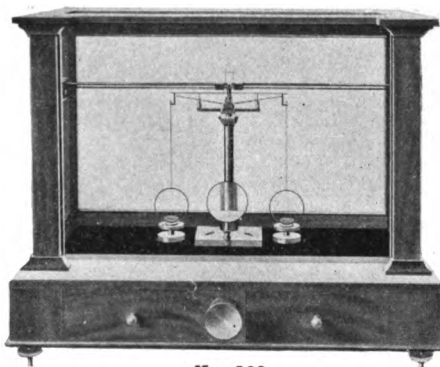
BUTTON BALANCE, STYLE No. 10

4-inch Beam. Sensibility 1-200 Mg.

334 Same in all respects as Style No. 9, excepting the beam, which is of plain type, without braces or pin graduations.

Price, as described. \$200.00

Price, with Multiple Rider Attachment. 225.00

BALANCES**THOMPSON'S****No. 336****No. 338****BUTTON BALANCE, STYLE No. 19**

5-inch Beam. Sensibility 1-100 Mg.

336 Agate edges and bearings, double rider attachment, fall-away pan-rests, star balancing device, skeleton hangers, reading glass for index, rider-bar lock, levels and leveling screws. Case is polished mahogany, with plate-glass base.

Price \$165.00

Price, Multiple Rider Attachment, extra 25.00

BUTTON BALANCE, STYLE No. 20

6-inch Beam. Sensibility 1-100 Mg.

338 This Balance has agate edges and bearings, double rider attachment, star-wheel balancing device, skeleton hangers, fall-away pan-rests, reading glass for index, rider-rod lock, levels and leveling screws. Case is polished mahogany, with counterpoised door and plate-glass base.

Price..... \$135.00

BUTTON BALANCE, STYLE No. 21

6-inch Beam. Sensibility 1-100 Mg.

340 Same in all respects as No. 20, except that it does not have a glass base.

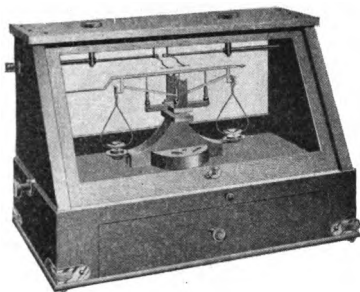
Price..... \$125.00

BUTTON BALANCE, STYLE No. 22

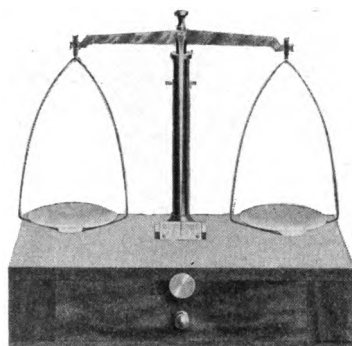
6-inch Beam. Sensibility 1-50 Mg.

342 Same as No. 21, except that it has a single rider attachment and is not as sensitive.

Price..... \$100.00

BALANCES**THOMPSON'S PORTABLE BALANCE OUTFIT**

No. 346
5-inch Beam
Sensibility 1—100 Milligramme
Style No. 24



No. 348
7-inch Beam
Sensibility 1 Milligramme
Style No. 37



Carrying Case for Outfit

COMPLETE PORTABLE BALANCE OUTFIT, STYLE No. 27

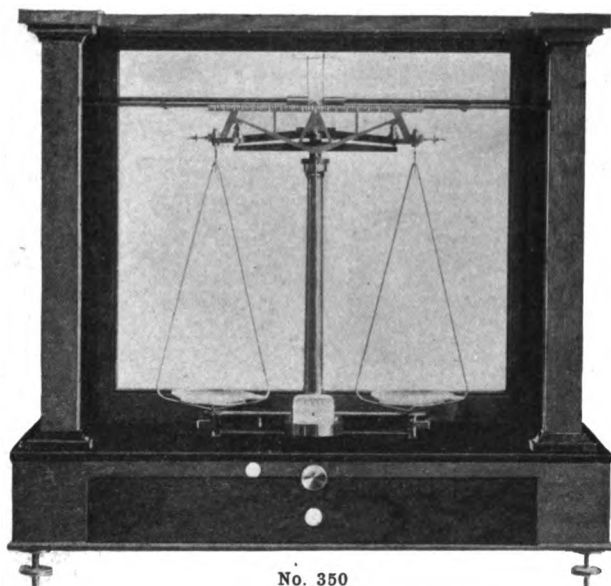
344 This outfit consists of button balance, Style No. 24, and pulp balance, Style No. 37, together in one carrying case. Dimensions of carrying case, 12 x 13 x 7½ inches.
Price..... **\$100.00**

5-inch Beam. Sensibility 1—100 Mg.

346 Has double rider attachment, agate edges and bearings, fall-away pan-rests, levels and leveling screws. Polished mahogany case with sliding door, which can be fastened at any point by turning the knob. By simply pressing a button the beam is locked in place for transport.
Price..... **\$85.00**

7-inch Beam. Sensibility 1 Mg.

348 On mahogany base with drawer in which the column, beam, hangers and pans can be packed for convenience in shipping. Pans 3 inches in diameter. Dimensions, 6 x 11 x 2½ inches.
Price..... **\$13.00**

BALANCES**AINSWORTH'S**

No. 350

ANALYTICAL BALANCE, TYPE Q

7-inch Beam. Sensibility 1-20 Mg.

Capacity, 200 Grammes

350 An analytical balance of precision with hard rolled nickel aluminum beam, agate edges and bearings, double rider apparatus of improved construction, skeleton hangers.

Has two level vials set in base, extension glass sub-base covering entire top of base; all metal work gold-plated except the center bearings and drop levers. Drop levers swing from center coincident with contact line of center edge and release all contacts with the edges when loading the balance.

Has finely polished French mahogany case with counterpoised sliding door in front and removable sliding door in back.

In the engraving the front door has been removed to better illustrate the balance.

Dimensions of case, 20 x 20 x 10 inches.

Price \$125.00

ANALYTICAL BALANCE, TYPE T

352 Similar in all respects to Type Q, but with 6-inch beam.

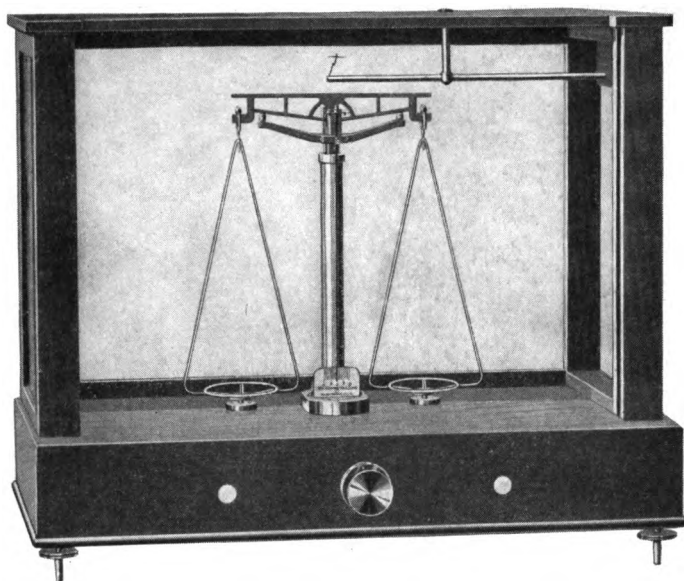
Price \$125.00

Either of the above types can be furnished adjusted to sensibility of 1-50 milligramme for \$15.00 (list) additional.

IMPROVED MULTIPLE RIDER CARRIER FOR TYPES Q AND T

354 Similar to that shown on page 24, No. 320 but with capacity of 1000 milligrammes; rendering unnecessary the handling of fractional gramme weights.

Price \$45.00

BALANCES**AINSWORTH'S****No. 356****ANALYTICAL BALANCE, TYPE L**

6-inch Beam. Sensibility 1-10 Mg.

Capacity, 200 Grammes

356 This balance is of the latest improved construction, the yokes and pan-rests being operated by a single thumb-piece, the same as our button balance, and having the same action. A balance of this construction can be operated more rapidly than where the pan-rests are operated by a separate button.

Has agate bearings and single rider apparatus of improved construction. In French polished mahogany case with counterpoised sliding door.

Dimensions of case, 20 x 17 x 10 inches.

Weight, net, 18 pounds. Packed, 50 pounds. Packed in zinc-lined case for export, 60 pounds.

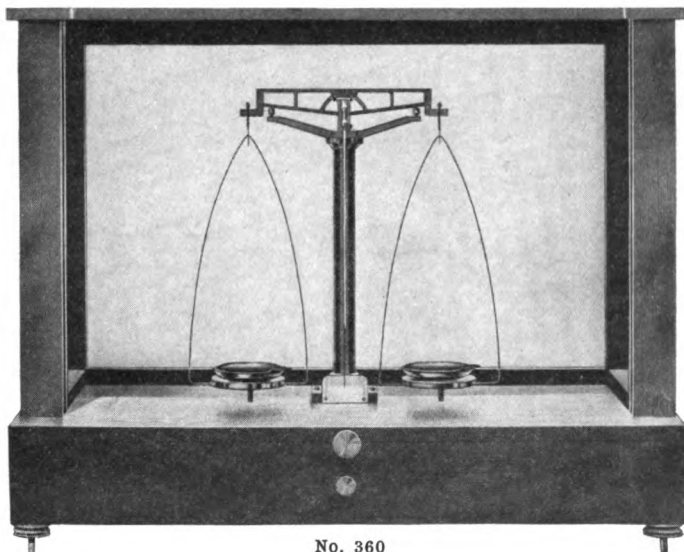
Dimensions, 27 x 21 x 15 inches.

Price \$65.00

ANALYTICAL BALANCE, TYPE LA

358 Same as Type L, described above, but with agate edges instead of steel.

Price..... 75.00

BALANCES**AINSWORTH'S**

No. 360

ANALYTICAL BALANCE, TYPE P

6-inch Beam. Sensibility 1-10 Mg.

Capacity, 200 Grammes

360 This type has agate bearings and is a good balance for rough analytical work and an excellent pulp balance.

It has mahogany case with counterpoised sliding door.

Dimensions of case, 20 x 17 x 10 inches. Packed, 27 x 21 x 15 inches, 5 cu. feet.

Weight, net, 18 pounds. Packed, 40 pounds; in zinc-lined case for export, 50 pounds.

Price.....each \$45.00

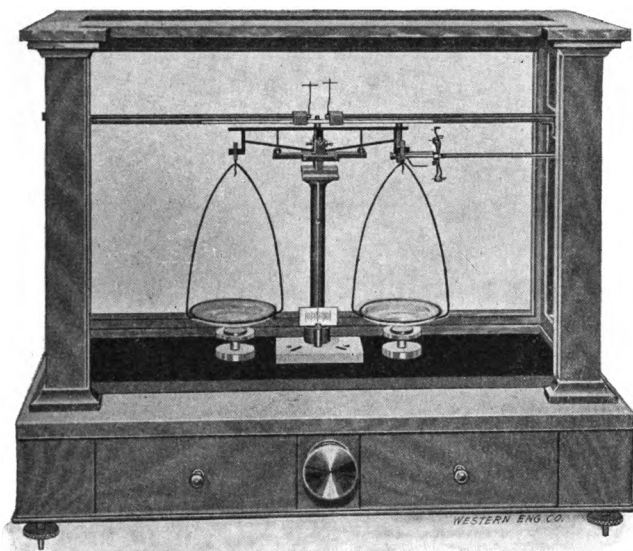
ANALYTICAL BALANCE, TYPE PC

362 This balance is the same as Type P, but with single rider carrier.

Price.....each 50.00

Price, Agate Edges on above Types, extra.....each 10.00

Price, Aluminum Beam on above Types, extra.....each 5.00

BALANCES**THOMPSON'S****No. 364****ANALYTICAL BALANCE, STYLE No. 28**

6-inch Beam. Sensibility 1-20 Mg.

Capacity, 200 Grammes in each pan

364 With this balance all weights below $\frac{1}{2}$ gramme are manipulated from outside of the case by means of the multiple rider attachment. The balance has agate edges and bearings, star-wheel balancing device, skeleton hangers, rider-rod lock, levels and leveling screws.

Polished mahogany case with counterpoise door and glass base. Dimensions, 20 x 17 x 10 inches.

Price, as illustrated and described..... \$145.00

Price, without Multiple Rider Attachment..... 120.00

ANALYTICAL BALANCE, STYLE No. 29

6-inch Beam. Sensibility 1-20 Mg.

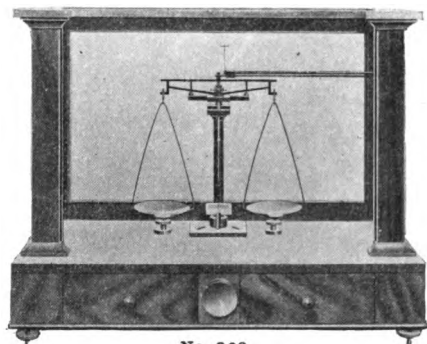
Capacity, 200 Grammes in each pan

366 Has agate edges and bearings, star-wheel balancing device, double rider attachment, skeleton hangers, three-inch glass pans, fall-away pan-rests, rider-rod lock, levels and leveling screws. Polished mahogany case with counterpoise door. Dimensions, 20 x 17 x 10 inches.

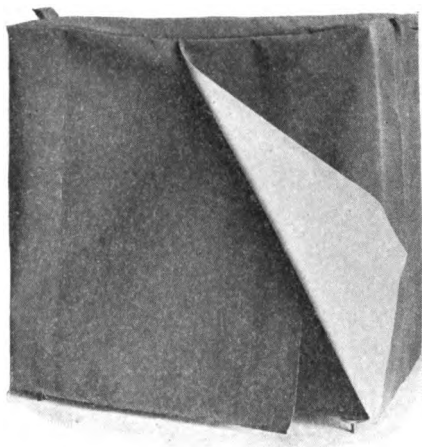
Price..... \$110.00

Price, with Multiple Rider Attachment..... 135.00

BALANCES AND BALANCE COVERS



No. 368



No. 370

THOMPSON'S CHEMICAL BALANCE, STYLE No. 31

6-inch Beam. Sensibility 1-10 Mg.

368 This balance has single rider attachment, steel knife edges and agate bearings, three-inch metal pans, fall-away pan-rests, levels and leveling screws, mahogany case with counterpoised door.

Price \$65.00

All foreign make balances, including Sartorius', Becker's and Kern's quoted on application.

DUST-PROOF COVERS

370 Every balance should be protected by a cover when not in use.

Our covers are made of the best rubber sheeting and are, therefore, dust and moisture-proof. By keeping the balance covered when not in use, much unnecessary brushing and cleaning will be avoided; and as many accidents occur during the operation of cleaning, one of these covers will save many times its cost in repair bills as well as keep the balance in a bright condition.

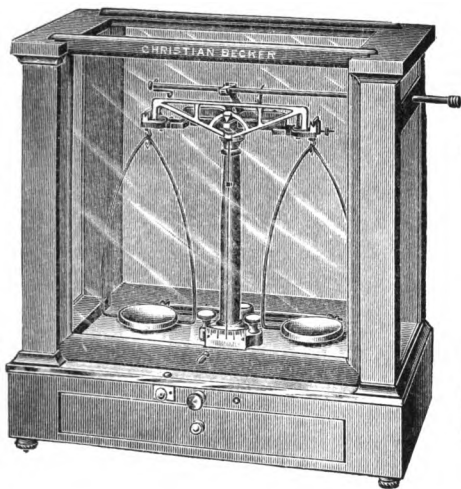
In ordering, give exact length and width of top of case; also extreme height. (We make all allowances for easy fit.)

Price, not over 18 in. high, 21 in. long \$1.50

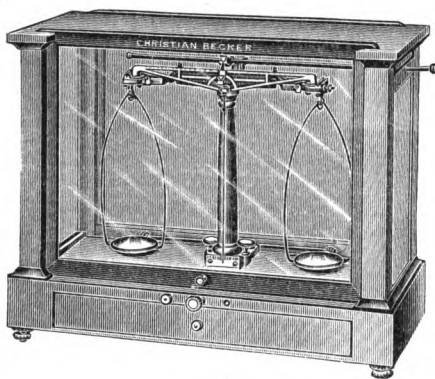
Specials to order in sizes larger than above, on application.

BALANCES

CHRISTIAN BECKER'S



Nos. 372-376



Nos. 378-380

SHORT ARM ANALYTICAL BALANCE, No. 8A

372 For a charge up to 200 grammes in each pan; sensible to 1-20 milligramme. In French polished mahogany glass case, front sliding frame counterpoised, with glass top to admit more light on rider. Mounted on plate-glass 5-16 inches thick. All bearings and knife edges of agate; beam graduated in 1-10 milligramme so that the rider can be placed on the center and used from the 0 point to either end. Provided with new improved arrangement for arrest of pans and beam, riders, apparatus for specific gravity and for weighing tubes. Pans $2\frac{3}{8}$ inches diameter; width of pan support 4 inches.

Price.....	\$125.00
374 Same as above, with Aluminum Beam, Bows, etc.....	145.00
376 Same as above, Imported, Gold Plated	110.00

ANALYTICAL BALANCE, No. 7

378 For a charge up to 100 grammes in each pan; in French polished glass case, front sliding frame counterpoised.

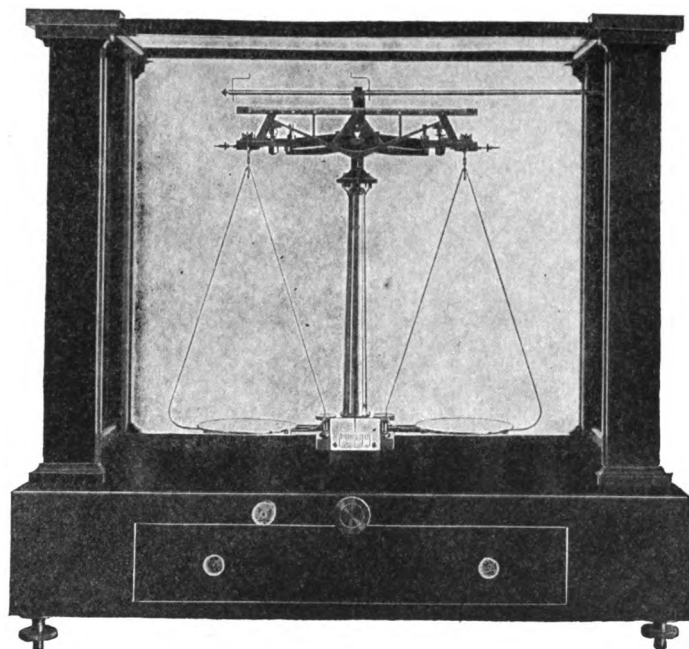
All bearings agate planes; with new improved arrangement for arrest of pans and beam; sensibility to 1-20 milligramme with its full charge.

Provided with apparatus for specific gravity, rider and for weighing tubes. Beam graduated into 1-10 part of milligramme. Pans $2\frac{3}{8}$ inches in diameter.

Price.....	\$85.00
380 Same as above, with Agate Knife Edges	95.00

Write us for prices, specifications and full information on all other types of Becker Balances.

BALANCES



No. 382

TROEMNER'S

No. 10 ANALYTICAL BALANCE

Beam, 7-inch (17.7 cm.). Sensibility, 1-20 (.05) Milligram.

Capacity, 200 Grams (8 ounces).

382 The beam is made of cold rolled aluminum, alloy having more than three times the tensile strength of pure aluminum, and being rolled (not cast) under high pressure rolls, all the invisible defects in the mass are eliminated and a great uniform density is secured throughout the sheet. From this sheet the beam is "Jigged," and this gives to the finished beam great stability, so that it will maintain its adjustment over a wide range of temperature change. The beam is then oxidized black with a non-corrosive preparation and divided into fifty parts each side of the center knife. These divisions, for legibility, are white, the beam is unobstructed on the top and the rider can be placed at any point.

The case is old, well seasoned mahogany, French polished; the top of base is covered with a black plate glass; the front sash is counterpoised, opening up the full width of the case; the rear sash also slides up, allowing the weighing of long subjects extending beyond the outside lines of the case; the top and ends are also fitted with glass sash, thus securing plenty of light from all directions. Size, 19x19x11 inches (48x48x28 cm.).

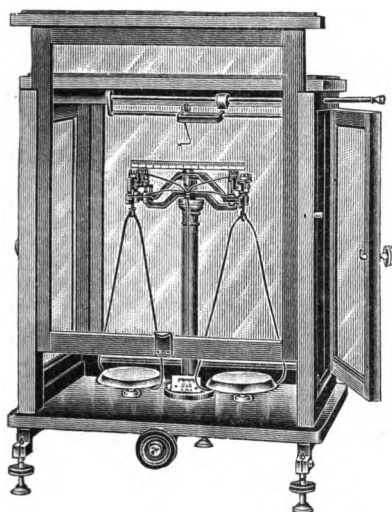
Finish. All the brass parts are gold plated.

This balance is in use at the U. S. Coast Survey, and by all the large steel and iron works.

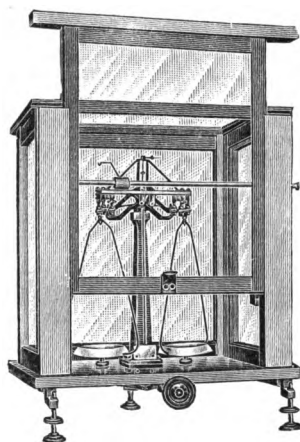
Price..... each \$125.00

Troemner Balances of all types quoted on application.

BALANCES



Nos. 384-386



No. 388

SARTORIUS ANALYTICAL BALANCE No. 5

- 384 With straight beam of phosphor-bronze or aluminum, which likewise serves as a rider slide, circular arresters, adjustable knife-edges, compensating suspensions and mechanical rider displacement. The pans are platinum plated. The knife-edges and planes are made of agate. The bottom is of black plate glass. This Balance swings unusually rapidly.

It is largely used in university and factory laboratories.

Capacity, 100 grammes, sensitiveness 1-10 milligramme.....\$110.00

Capacity, 200 grammes, sensitiveness 1-10 milligramme..... 120.00

SARTORIUS ANALYTICAL BALANCE No. 6

- 386 Same sensitiveness as No. 5, but not so elegantly finished; has pillar of bronzed cast iron, instead of lacquered brass.

Capacity, 200 grammes, sensitiveness 1-10 milligramme.....\$ 90.00

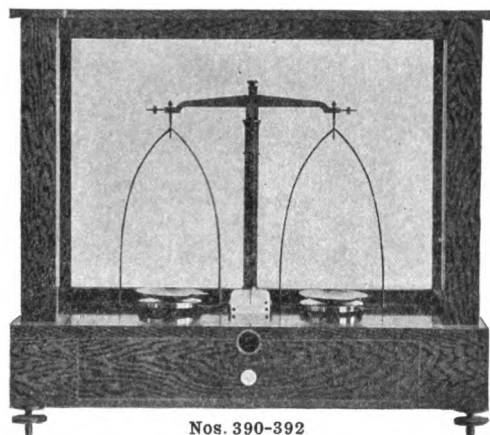
Capacity, 500 grammes, sensitiveness 15-100 milligramme..... 110.00

SARTORIUS "AMERICA" MODEL BALANCE

- 388 The compensating hangers are made in one piece, which prevents their falling apart, and being suspended on three points, they allow for uneven balancing; Magnalium short beam, rider arrangement, agate knife-edges and bearings, platinum plated pans; capacity, 200 grammes, sensitive to 1-10 milligramme; a well built, inexpensive balance, suitable for general analytical work. Highly recommended.

Price.....\$65.00

WRITE.—Concerning duty, free importation on these and other foreign makes of balances.

BALANCES**AINSWORTH'S****PULP BALANCE, TYPE M**

6-inch Beam. Sensibility $\frac{1}{2}$ Mg.
Capacity, 200 Grammes

390 Has agate bearings, pan-rests, level and leveling screws, and is ordinarily furnished with $2\frac{1}{2}$ -inch pans, but 3-inch pans will be furnished when specified.

Has French polished mahogany case with counterpoised sliding door.

Dimensions, 17 x 15 x 8 inches.

In the engraving the counterpoised sliding door has been removed to better illustrate the balance.

Weight, net, 10 pounds. Packed, 30 pounds. Packed for export in zinc-lined case, 36 pounds.

Dimensions, 24 x 13 x 18 inches.

Price..... \$30.00

PULP BALANCE, TYPE MA

392 Same as Type M, but with agate edges.

Price..... \$40.00

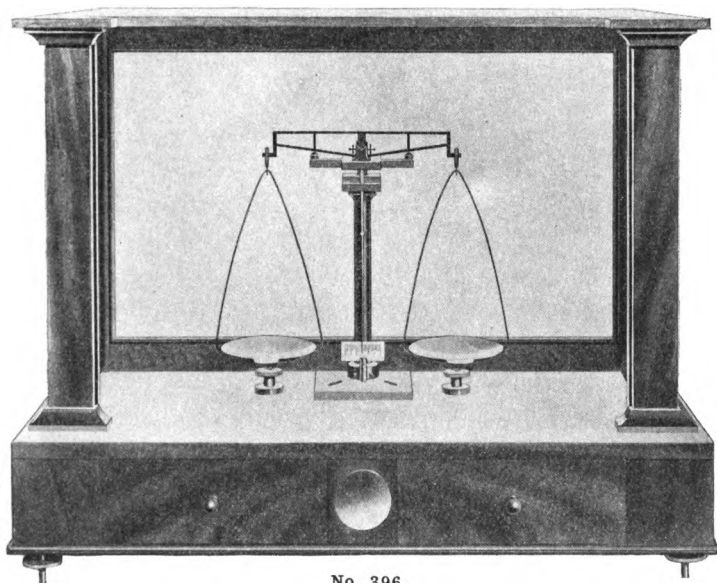
PULP BALANCE, TYPE N

6-inch Beam. Sensibility 1 Mg.
Capacity, 200 Grammes

394 Similar to Type M, in general construction; without glass case, but mounted on polished mahogany base, into the drawer of which the beam, column, hangers and pans pack for carrying; has $2\frac{1}{2}$ -inch pans.

Dimensions of case, 12 x 6 x 3 inches.

Price..... \$15.00

BALANCES**THOMPSON'S**

No. 396

PULP BALANCE, STYLE No. 33

6-inch Beam. Sensibility 1-10 Mg.

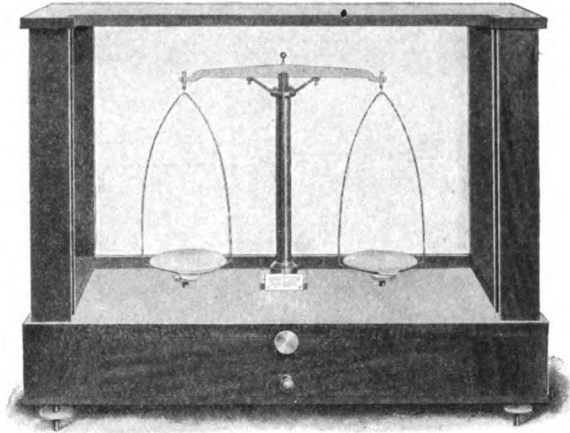
396 Has steel edges and agate bearings, fall-away pan-rests, 3-inch metal pans. Mahogany case with counterpoised door. Dimensions, 20 x 17 x 10 inches.

Price..... \$55.00

PULP BALANCE, STYLE No. 367-inch Beam. Sensibility $\frac{1}{2}$ Mg.

398 Similar to Style No. 35 on page 40, but has no arms to prevent beam from falling off when one hanger is removed, and center edge is not raised off bearing when balance is not in use. Mahogany case with counterpoised door. Dimensions, $17\frac{1}{2}$ x 8 x 15 inches.

Price..... \$32.50

BALANCES**THOMPSON'S****No. 400****PULP BALANCE, STYLE No. 35**

7-inch Beam. Sensibility $\frac{1}{4}$ Mg.

400 Special attention is called to the construction of the center bearing in this balance. It is an agate plane, instead of a groove as in most balances of this class, the advantage being that the contact with the knife edge can be easily kept clean, and when the balance is not in use, the knife edge does not rest on the bearing. In all pulp balances that have a grooved center bearing it is necessary to have a plate cover each end of the groove in order to keep the beam in place. This forms a corner in which the dust from the pulp collects, surrounding the knife edge, and preventing free oscillation.

The balance has steel edges and agate bearings, adjustable pan-rests, three-inch metal pans, fly balancing device, level and leveling screws. Mahogany case with counterpoised door. Dimensions, $17\frac{1}{2} \times 8 \times 15$ inches.

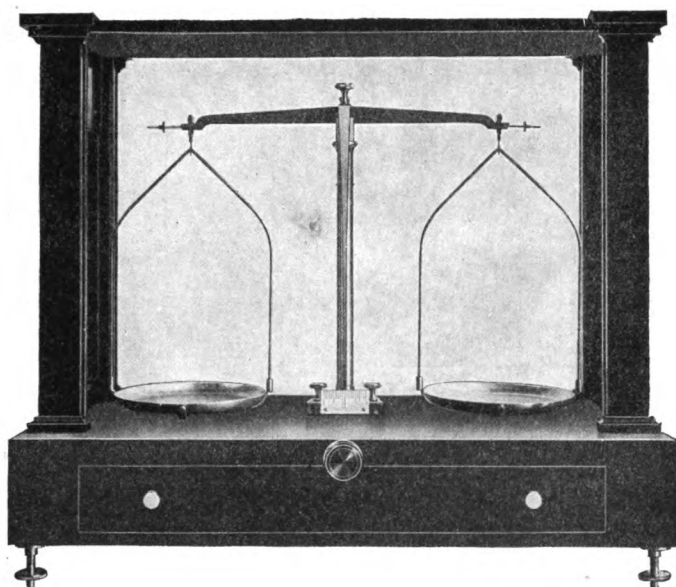
Price..... \$35.00

PULP BALANCE, STYLE No. 37

402 Sensibility 1 milligramme. Mounted on polished mahogany base, without glass case, but has drawer in which the column, beam, hangers and pans can be packed for convenience in shipping. Fly adjustment. Pans 3 inches in diameter.

Price..... \$13.00

For illustration of Style No. 37 Balance, see page 29, No. 348.

PULP BALANCES**TROEMNER'S****No. 404****PULP BALANCE, No. 26**

Beam, 8-inch (20 cm.). Sensibility, 1-2 (.5) milligram.

Capacity, 200 grams (8 ounces).

404 Has agate bearings, vial levels, leveling feet, adjusting screws on end of beam 3 inches (7.5 cm.), solid nickel pan.

In French polished mahogany case, with counterpoised sliding door; has movable nickel pans, eccentric lift.

Price..... \$27.00

PULP BALANCE, No. 25

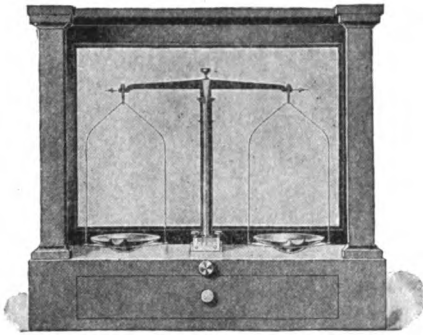
Sensibility, 5 milligrams.

406 Of heavier and stronger design and construction, and used for pulp, fluxes and as a general weighing in balance. Made in three sizes, having steel knives and bearings, levels and leveling feet, adjusting screws on ends of the beam and nickel pans. French polished mahogany case, counterpoised sliding door.

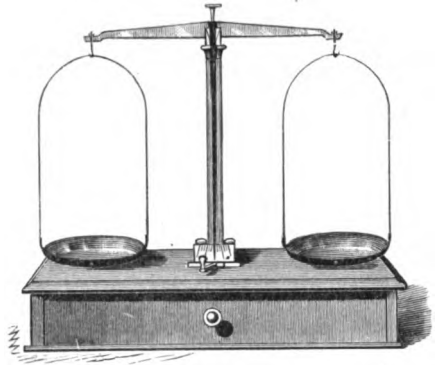
No.	Beam	Pans	Capacity
1	12-inch (30 cm.)	6-inch (15 cm.)	50-ounce (1.5 kilos)
2	10-inch (35 cm.)	4-inch (10 cm.)	20-ounce (600 grams)
3	9-inch (22.5 cm.)	3¼-inch (8.2 cm.)	10-ounce (300 grams)
Price, No. 1 23½x22x11-inch case, 58x55x28 cm.....			\$45.00
Price, No. 2, 20x10x18-inch case, 50x25x45 cm.....			37.00
Price, No. 3, 17x18x 8-inch case ,43x45x20 cm.....			30.00

PULP BALANCES

TROEMNER'S



Nos. 408-410



No. 412

TROEMNER'S PULP BALANCE, No. 63

408 This balance is one of the best and most reliable that can be placed on the prescription counter. For stability and endurance it has no superior. There is no other form of scale known to mechanics that will approach it for reliability and uniform accuracy.

It has mahogany case, counterpoised door, sliding upward; has solid nickel pans; has adjusting screw on beam to balance scale by; it is sensible to 1 mg. (1-50 grain); it is easily one of the leading favorites.

Diameter of pans, $2\frac{3}{4}$ inch; size of beam, 8 inches.

Price..... \$22.00

410 Same scale as described above, but provided with all agate bearings.

Price..... 27.00

TROEMNER'S PULP BALANCE, No. 22

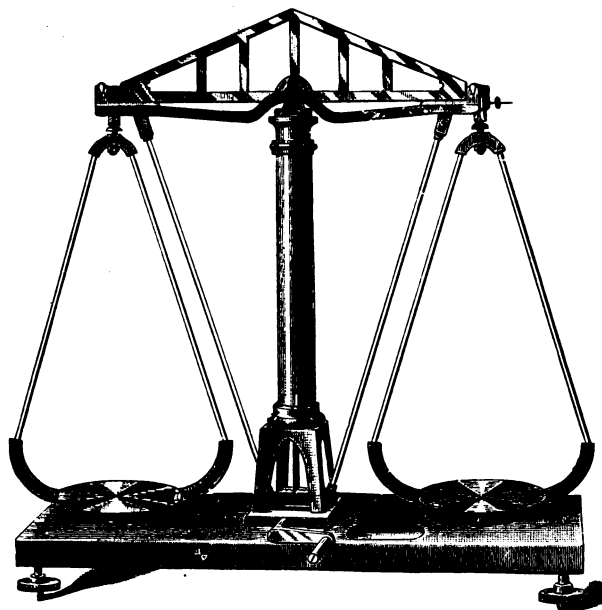
412 Without case: for weighing pulp, chemicals, quinine, jewelry, etc., on French polished box, with drawer, pans are movable and nickel-plated; has improved lever; beam has adjusting screws; scale sensible to 1-30 grain; all of the highest finish.

No.	Beam	Pans	Capacity
1	14	6	25 oz.
2	10	4	10 oz.
3	$8\frac{1}{4}$	3	5 oz.

Price, No. 1..... \$24.00

Price, No. 2..... 18.00

Price, No. 3..... 15.00

BULLION BALANCES**TROEMNER'S****Nos. 420-424****BULLION BALANCES, TYPE No. 170**

Balances have brass beams, arches and plates, the column is of iron, neatly enameled. The base is of walnut, fitted with leveling screw feet and level, adjusting screws on end of beam, lift beam release, steel knife-edge and bearings.

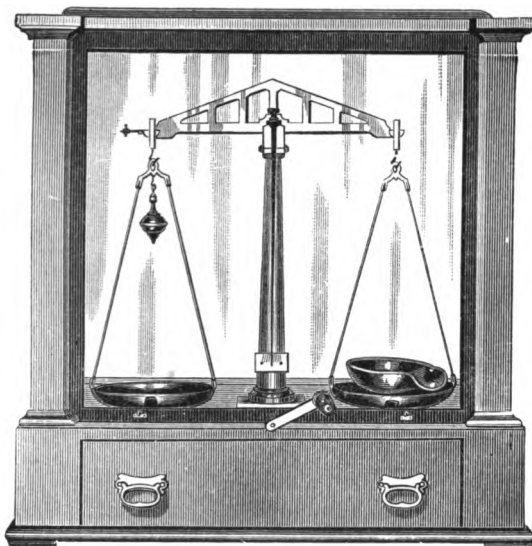
A full set of weights included with each balance; the weights from 50-ounce down are of brass, in wood block; the larger weights are of iron.

414	Capacity, 500 ounces.....	\$95.00
416	Capacity, 1000 ounces.....	120.00
418	Capacity, 1500 ounces.....	150.00

BULLION BALANCES, TYPE No. 175

These balances are of the highest type of mechanical excellence. They are made in three sizes. The beam is of bronze. The column and base are of iron neatly enameled. Fitted with adjustable screw feet and level. The needle works within the column, passing over an ivory index fitted in the base of the column. The arches and pans are of brass. Fall-away beam support and push button pan-arrest, steel knife-edges and bearings. The price does not include weights.

420	Price, capacity, 500 ounces	\$160.00
422	Price, capacity, 1000 ounces	200.00
424	Price, capacity, 1500 ounces	210.00

BULLION AND SPECIE SCALES**TROEMNER'S****No. 426****BULLION AND SPECIE SCALE, TYPE No. 24**

426 Balance of the very finest finish; in French polished glass case; with counterpoised door, sliding upward; has open brass beam and arches; 8-inch nickel pans that are movable; capacity, 200 oz., and sensible to 1 grain; has extra pan for loose matter; inside measurement of case is 35 inches high, 30 inches wide.

Price includes a full set of brass weights, 50 oz. to 1 grain (100 oz. in all); these are neatly fitted in the drawer of glass case.

Price.....\$ 97.50

428 Same as 426 with weights from 100 oz. and down (200 oz. in all)..... 107.50

BULLION AND SPECIE SCALE, TYPE No. 23

430 On French polished box with drawer; provided with eccentric for lifting bows and movable pans. For 50 oz. in each pan. Sensible to $\frac{1}{2}$ grain with its full charge.

Price.....\$35.00

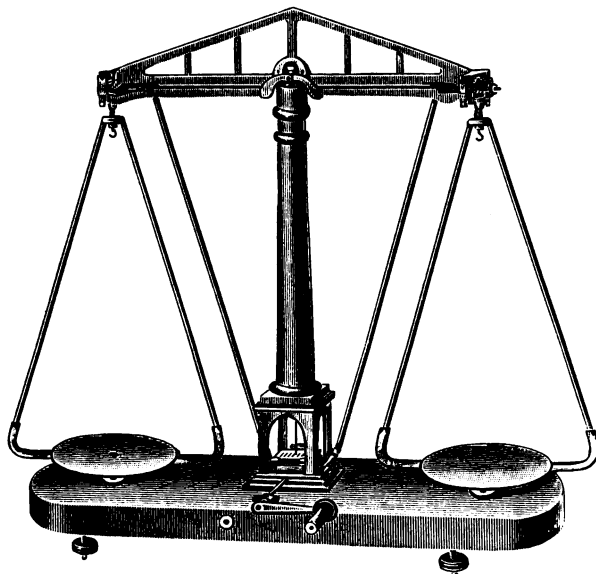
BULLION AND SPECIE SCALE, TYPE No. 25

432 Same as 430. For 100 oz. in each pan. Sensible to $\frac{1}{2}$ grain 49.50

BULLION AND SPECIE SCALE, TYPE No. 27

434 Same as 432. For 300 oz. in each pan. Sensible to 1 grain with its full charge.

Price..... 66.00

BULLION BALANCES**CHRISTIAN BECKER'S****No. 436****BULLION AND SPECIE SCALE, No. 29**

436 Carrying 500 ounces in each pan; sensible to 1 grain with its full charge. All bearings agate planes, with new improved construction for the arrestation of beam and pans. Provided with set screws and level.

Price..... \$165.00

BULLION AND SPECIE SCALE, No. 31

438 Same as No. 29 Scale. For 2,000 ounces in each pan; sensible to 2 grains with its full charge.

Price..... \$220.00

BULLION AND SPECIE SCALE, No. 33

440 Same as No. 31 Scale. For 5,000 ounces in each pan; sensible to 2 grains with its full charge.

\$600.00

BULLION AND SPECIE SCALE, No. 30

442 In French polished mahogany glass case, with counterpoised front sliding frame. For 500 ounces in each pan; sensible to $\frac{1}{2}$ grain with that charge.

Price..... \$250.00

BULLION AND SPECIE SCALE, No. 32

444 Same as No. 30 Scale. For 2,000 ounces in each pan; sensible to 1 grain.

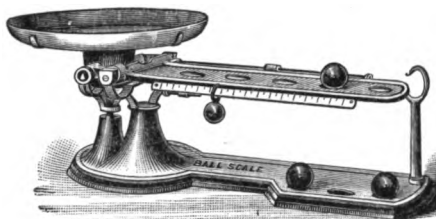
Price..... \$310.00

BULLION AND SPECIE SCALE, No. 34

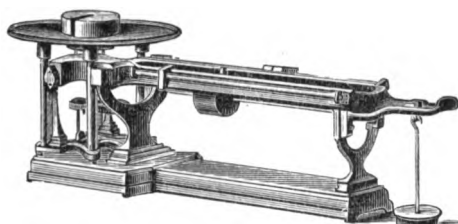
446 Same as No. 30 Scale. For 5,000 ounces in each pan; sensible to 1 grain.

Price..... \$750.00

BULLION AND SOLUTION SCALES



Nos. 448-450



No. 452

TROEMNER'S BALL SCALE, No. 124

448 A new and elegant counter scale, the latest modification in weighing apparatus. Scale has 10-inch nickel pan; has extra sliding poise to balance bottles, etc.; will weigh from $\frac{1}{4}$ -ounce to 16 pounds without the use of ordinary weights; elegantly finished in nickel and bronze. In every respect a perfect scale, and saves the cost of a set of weights. Diameter of pans, 10 inches; capacity, 16 pounds.

Price..... \$14.00

BALL SCALE

450 Same as above, only in metric standard; capacity 6 kilos, divisions on the beam 10 grammes.

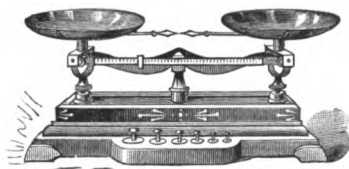
Price..... \$14.00

MINE AND SMELTER SUPPLY CO.'S NEW BULLION SCALE

452 A good scale for all purposes where weighing closer than 2-100 ounce is not required. It is provided with weighing beam and two sliding poises; one side is divided into fifty parts, each part representing 2-100 ounce; the other side is divided into thirty-five parts, each part representing one ounce Troy. A bar with a sliding poise is placed under the weighing beam for the purpose of balancing bullion pan. Weights included in price.

Price, 600 oz..... \$25.00

Price, 1000 oz..... 30.00



No. 454

TROEMNER'S BULLION BALANCE

No. 189

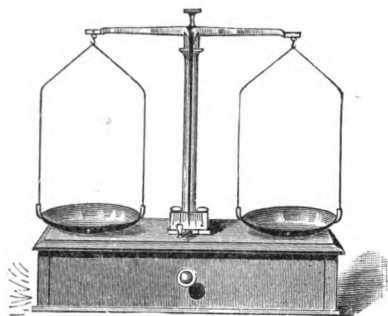
454 With 6-inch nickel pans; all bearings are of agate, to insure the highest attainable sensibility with endurance.

Sliding beam on front, divided into pennyweights and grains, by which the exact weight of an article is quickly ascertained, thus doing away with small weights; a set of weights (12 oz.) is arranged on a platform on front of scale. Scale is sensitive to $\frac{1}{2}$ grain.

Price..... \$18.00

BULLION AND SOLUTION SCALES

TROEMNER'S U. S. MINT BULLION SCALES



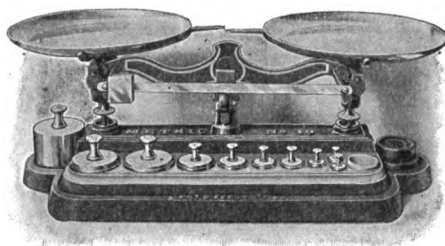
No. 456

456 Indicator pointing downward; on a polished walnut box, with drawer.

Very accurately adjusted; a set of Troy cup weights, including pennyweights and grain weights, furnished with each scale.

No.	Beam	Diam. Pans	Capacity
0	13 in.	6	64 oz.
1	10 in.	5	32 oz.
2	9 in.	4	16 oz.
3	7 in.	3½	8 oz.
4	6½ in.	3	4 oz.

Price, No. 0.....	\$24.00
Price, No. 1.....	15.00
Price, No. 2.....	12.00
Price, No. 3.....	10.00
Price, No. 4.....	8.00



No. 458

METRIC SOLUTION SCALES

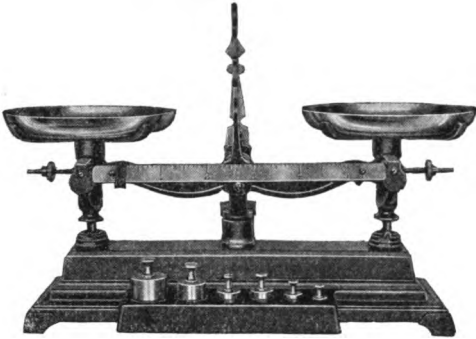
458 An even balance for making rapidly reagents or any other kind of composite solutions.

The scale has two movable brass pans, and the weight rack is attached to the base of scale, and in it are fitted the weights, which are made of solid brass. The scale is provided with a side beam in front, undivided, and is used for balancing the bottle or containers. With this scale can be made the most accurate solutions. Sensibility, ½ gramme.

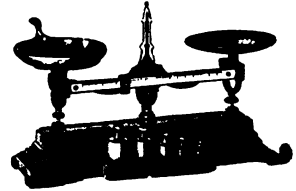
No.	Diam. of Pans	Capacity	Price
10	9 inches	5 kilos to 1 gramme	\$18.00
8	5½ inches	1 kilo to 1 gramme	15.00

NOTE.—We are prepared to quote prices for duty-free importation on all classes of goods for educational institutions.

LABORATORY, HAND AND POCKET SCALES



No. 460



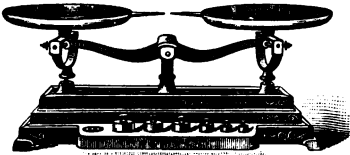
No. 462

TROEMNER'S BAKERS' SCALE

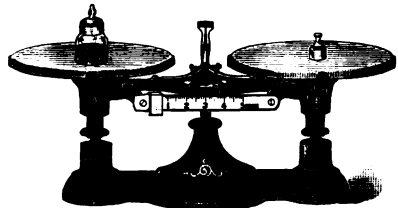
460 Troemner's Bakers' Scale. So named as it was originally made for their use, being a small balance with large pans; length, 12 inches; width, 9 inches; height, 5 inches; pans 5 inches in diameter; beam graduated up to 5 grammes and divided into 1-10 gramme; a set of accurate brass weights in block, which is fastened to the front of the scale, are included; capacity, 200 grammes to 1-10 gramme.
Price..... \$8.00

TROEMNER'S DISPENSING SCALE, TYPE No. 6

462 With side beam and sliding weight, to weigh 4 ounces. Handsomely finished; has 3 $\frac{3}{4}$ -inch nickel-plated movable pans; a side beam in front of scale with a sliding weight; this beam is divided into 120 divisions, each division representing one grain; an extra row of metric divisions is placed on bottom edge of beam, each representing one decigramme. Platform or shelf is attached to base of scale, in which are fitted a set of solid brass Troy weights, 2 ounces and down. Sensible to $\frac{1}{2}$ grain; capacity, 4 ounces.
Price..... \$8.00



Nos. 464-466



No. 468

TROEMNER'S LABORATORY SCALE, TYPE No. 7

464 Specially designed for laboratory and pharmaceutical work; has 6-inch movable nickel pans; will carry 1 lb. in each pan; sensible to $\frac{1}{2}$ grain; with a full set of weights, running from 8 ounces Troy and down to 1 grain, neatly fitted in a projecting shelf attached to the base.
Price..... \$9.00
466 Troemner's Laboratory Scale No. 7, with Metric weights..... 9.00

BALANCE, HARVARD TRIP

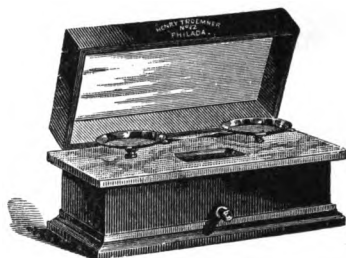
468 With two 6-inch round porcelain plates and side beam for laboratory work; capacity, 1 kilogramme to 1-10 gramme.
Price..... \$7.50

LABORATORY, HAND AND POCKET SCALES

BOX PRESCRIPTION SCALES



No. 470



No. 472

CLIMAX BOX PRESCRIPTION SCALES

Type No. 120

470 This scale has $2\frac{3}{4}$ -inch nickel-plated pans; cherry-mahogany box, white marble top; hinged cover; is a reliable and substantial scale.

Price..... \$12.50

472 The same as 470, with drawers.

Price..... 13.50

BOX PRESCRIPTION SCALES

Type No. 12

474 In French polished ebony box with marble top, which has countersunk basin in it to hold the weights; pans are of solid nickel; scale is sensible to 1-20 grain; has glass cover provided with stop-hinges, all of the finest workmanship, and one of the most popular scales we have ever handled. Used and sold in all parts of the world. To avoid corrosion and cleaning, no "metal" parts are put on the outside of box, excepting the pans and hinges.

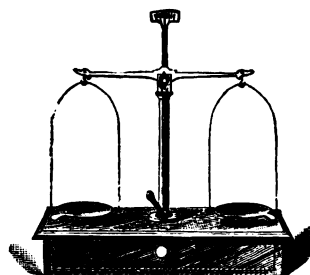
No.	Diam. of Pans	Price
12	3	\$18.00
13	$3\frac{3}{4}$	20.00

ARMY PRESCRIPTION SCALES

Type No. 9

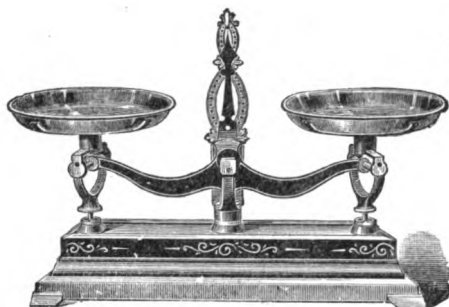
476 On polished walnut box; scale can be taken apart and packed away in drawer of box; a well-finished and reliable scale, made in a mechanical way; well adapted for physicians' offices; a full set of weights, 2 drachms to $\frac{1}{2}$ grain included.

No.	Beam	Diam. of Pans	
0	8	$2\frac{3}{4}$	
1	7	$2\frac{1}{2}$	
2	$5\frac{3}{4}$	2	
Price, No. 0			\$6.00
Price, No. 1			5.00
Price, No. 2			3.50



No. 476

LABORATORY, UNION AND PLATFORM SCALES



No. 478



No. 484

TROEMNER'S ROBERVAHL SCALE, No. 75

478 Neatly ornamental in gold lines. Heavy brass pans and brass indicator.

No.	Size of Pan	Capacity	Price
2	9 in.	15 pounds	\$7.50
3	8 in.	10 pounds	6.00
4	5½ in.	5 pounds	5.00

ROBERVAHL SCALE, FRENCH MAKE

480 Cheaper than 478. For coarse weighing.

Capacity	Size of Pan	Price
10 pounds	7¾ in.	\$5.00
5 pounds	5¾ in.	4.00
2 pounds	5 in.	3.25
1 pound	4¾ in.	2.75

UNION SCALE

482 With two platforms, especially convenient for a large variety of uses; capacity from ½ oz. to 32 pounds in the scoop, and to 245 pounds on the platform, which measures 10 x 13¾ inches.

Price, with tin scoop, each.....\$14.50

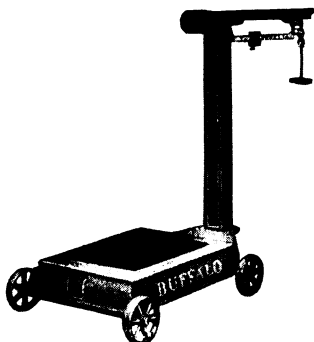
Price, with brass scoop, each.....15.50

484 Union Scale. A more simple form, with only the large platform, but also with tin scoop, each.....7.50

PLATFORM SCALES

WITH WHEELS

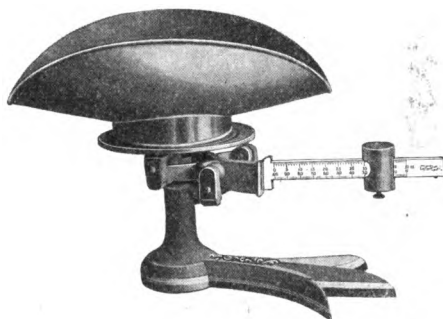
Adapted for all kinds of general weighing. The beams and poises are of brass. The three smaller sizes have beams marked to 50 pounds by ¼ pound marks; larger sizes, beams are marked 100 pounds by ½ pound.



Nos. 486-500

No.	Capacity	Platform	Price
486	400x¼ pounds	15 x21 in.	\$26.00
488	600x¼ pounds	16 x25 in.	33.00
490	800x¼ pounds	17 x25 in.	38.00
492	1000x½ pounds	17 x26 in.	43.00
494	1200x½ pounds	20 x28 in.	49.00
496	1600x½ pounds	21½x30 in.	56.00
498	2000x½ pounds	23 x33 in.	75.00
500	2500x½ pounds	24 x33 in.	85.00

MOISTURE SCALES



No. 502

502 Used at smelting and similar plants for determining the percentage of moisture in ores, etc. The ordinary capacity scale is made to weigh a sample of 50 ounces, but special scales are manufactured to order of other capacities as described, below. The scale beam has two rows of graduation, the upper row giving the weight in ounces, or pounds, and fractions thereof; the lower row giving the percentages. The percentage row on all scales is figured 100 to 0 per cent, by 1 per cent, and thus the reading gives the direct percentage of loss. The given amount of ore is first weighed, then dried or roasted, and reweighed to note the loss of moisture or sulphur. From 50-oz. to $\frac{1}{2}$ -oz. capacity.

Each..... \$10.00

504 Same as 502, from 50-oz. to $\frac{1}{2}$ -oz., but with fractional graduations of 1 x 1-10 per cent on tip end of the main beam, and both the main and fractional beams are fitted with patent latch poises.

Each..... \$25.00

506 Same as 502, from 2 kilos to 10 grammes, each..... 10.00

508 Same as 504, metric, with fractional graduation, each..... 25.00

MOISTURE SCALE

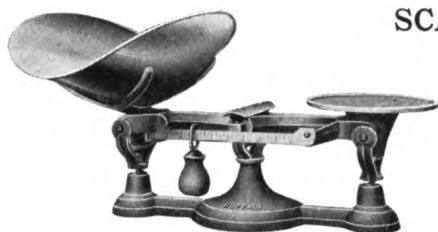
510 Special modification of standard moisture scale as adopted by the American Smelting & Refining Company and Taylor & Brunton as their standard.

Description

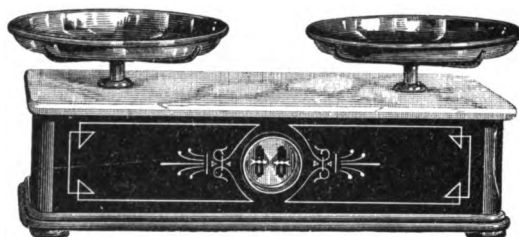
This scale is similar to 504, but is provided with two beams, each graduated on both sides. Main beam graduated to $4\frac{1}{2}$ lbs. avoirdupois; percentage row to 90 per cent. Fractional beam graduated to $\frac{1}{2}$ lb. avoirdupois; percentage graduation from 1-10 of 1 per cent to 10 per cent. Scale is fitted with seamless brass scoop. Beams being marked on both sides enables both buyer and seller to read the weights.

Each.....net \$20.00

SCALES



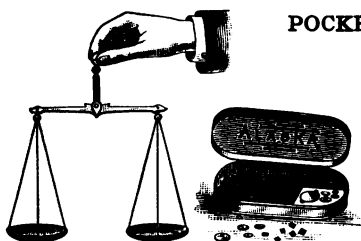
No. 512



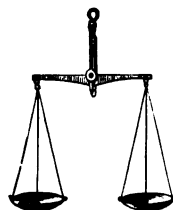
No. 516

- 512 M. & S. S. Co's. Tin Scoop Scale. With japanned weights, weighing from 4 pounds to $\frac{1}{2}$ oz. The scale is strong and well made and accurate; and has brass beam, each..... \$4.00
- 514 M. & S. S. Co's. Flux Scale. Like No. 512, with side beam graduated to $\frac{1}{4}$ oz.; including set of japanned weights and tin scoop.
- | Capacity.....lbs. | 6 | 10 | 16 | 25 |
|-------------------|--------|-------|-------|-------|
| Price.....each | \$7.75 | 10.00 | 12.75 | 20.75 |
- 516 Ebony Box Scale, No. 89. In ebony box, gold lines; gilt dial; heavy nickel-plated pans; marble top.
- | No..... | 0 | 1 | 2 |
|-----------------------|---------|-------|-------|
| Diam. of pans.....in. | 7 | 8 | 9 |
| Capacity.....lbs. | 10 | 15 | 25 |
| Price.....each | \$12.00 | 14.00 | 16.00 |

POCKET AND HAND SCALES



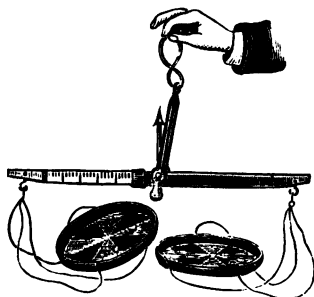
No. 518



No. 520

- 518 Miner's Pocket Scales. Made in three sizes, and strictly first class. They are put up in neat tin boxes, with oval ends, and enameled green with bronze stripes; entire scale is of brass, including deep brass pans, hung with brass chains; full set of accurate weights are included.
- | Capacity.....oz. | 1 | 2 | 4 |
|------------------|--------|------|------|
| Price.....each | \$2.00 | 2.50 | 3.00 |
- 520 Hand Scales. With fine brass beams and horn pans, suspended by silk cords, fine steel bearings, very sensitive.
- | Beam.....in. | 4 | 5 | 6 | 7 | 8 | 10 |
|----------------|----------------|------|----------------|------|----------------|----------------|
| Pans.....in. | $1\frac{1}{2}$ | 2 | $2\frac{1}{2}$ | 3 | $3\frac{1}{2}$ | $4\frac{1}{2}$ |
| Price.....each | \$1.20 | 1.50 | 1.75 | 2.00 | 2.50 | 3.00 |

BALANCES AND SUNDRIES



No. 522



No. 524

- 522 **Hand Scales.** With sliding weight, on graduated brass beam, horn pans, very delicate and sensitive. No weights needed.
 To weigh 5 grains, divided into 1-10 grains.....each \$3.00
 To weigh 15 grains, divided into $\frac{1}{2}$ grains.....each 3.50
 To weigh 25 ctgm's. divided into $\frac{1}{2}$ ctgm's.....each 3.00
- 524 **Hand Scales.** In box, brass beam and pans, with weights.....each .85



No. 526



No. 528

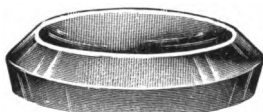


Nos. 530-532

- 526 **Scale Pans.** With handles.
 Glass, $2\frac{1}{2}$, $2\frac{3}{4}$, 3 inches.....per pair .40
 Nickel, $2\frac{1}{2}$, $2\frac{3}{4}$, 3 inches.....per pair .75
 Aluminum, $2\frac{1}{2}$, $2\frac{3}{4}$, 3 inches.....per pair .75
- 528 **Scale Pans.** For counter scales, nickel-plated.
 Size.....inches 6 7 8 9 10
 Per pair.....\$1.00 1.50 2.00 2.50 3.00
- 530 **Scale Pans.** Of aluminum, for assay balances, $\frac{3}{4}$ inch diameter, accurately checked.....per pair \$1.00
- 532 **Scale Pans.** Of glass, same size and style as aluminum.....per pair 1.50



No. 534



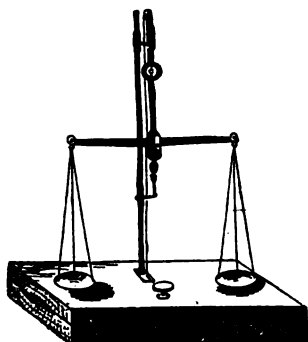
No. 536



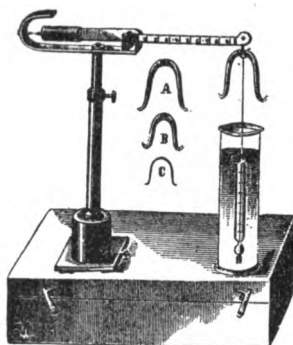
No. 540

- 534 **Scale Glass Feet.** For holding leveling screws of balances, giving perfect insulation.....set of four .40
- 536 **Scale Rubber Pads.** For same purpose.....each .20
- 538 **Scale Watch Glasses.** Glass, accurately counterpoised for analytical work.
 Sizes: $2\frac{1}{2}$, 3, and $3\frac{1}{2}$ inches in diameter.....per pair 1.00
- Scale Covers.** See page 34, No. 370.
- 540 **Weighing Capsules.** Of pure nickel, $4\frac{1}{2}$ inches long.....each .40

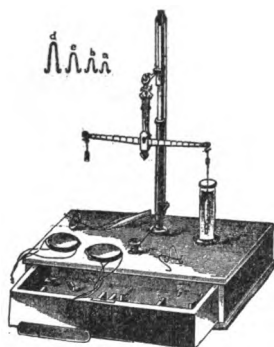
BALANCES



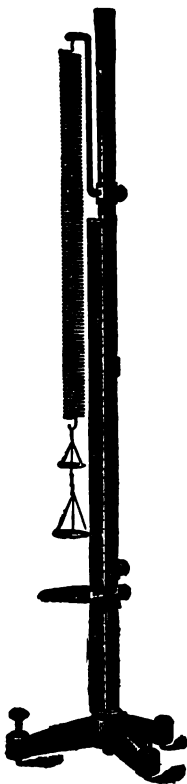
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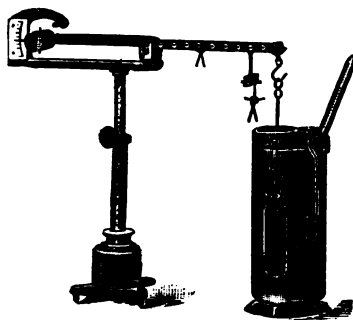
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No. 546



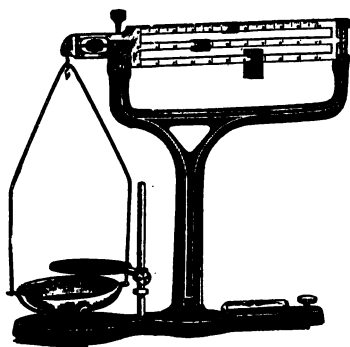
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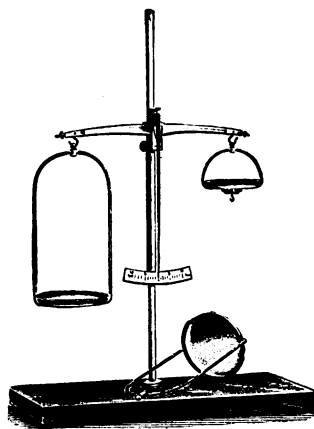
No. 548

- 542 **Plattner's Blow Pipe Balance.** For blow pipe analysis, sensitive to 1 milligramme. Nickel-plated, with set of weights, from 1 gramme to 1 milligramme, in polished wooden case. \$22.50
- 544 **Mohr's Specific Gravity Balance.** For both liquids and solids, with Reimann's Patent Thermometer, riders, glass cylinder, forceps, also extra pans for regular weighings. 20.00
- 546 **Westphal's Specific Gravity Balances.** For liquids only, in polished box, with movable support, and Reimann's Patent Thermometer. . 15.00
 Reimann's Thermometer. 3.00
 Set of rider weights. 1.50
- 548 **Sartorius Hydrostatic Balance.** For specific gravity, determination of liquids, complete in case. 30.00
- 550 **Prof. Jolly's Spiral Balance.** For rapid and exact determination of the specific gravity of minerals, with three assorted spirals, on wooden support and scale on mirror glass. 20.00

BALANCES



No. 552

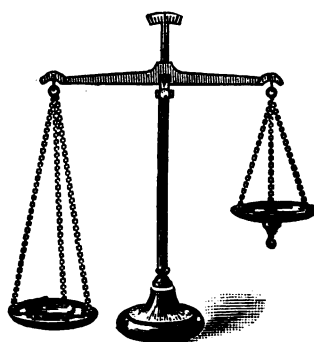


No. 554

- 552 Balance, New "Alward" Triple Beam. A convenient, time-saving form in chemistry and physics work, with sliding non-detachable weights, compactly fitting the beams. Capacity, 111 grammes. The upper beam has centigramme divisions; the middle beam, 1 gramme; the lower beam, 10 grammes. The sensibility is 3 milligrammes with load. Complete.....\$20.00
- 554 Balance, Combination. For regular and specific gravity weighings; beam can be raised on the brass column. Beam, 11 inches; pans, 4 inches; column, 20 inches; capacity, 250 grammes..... 8.00



No. 556



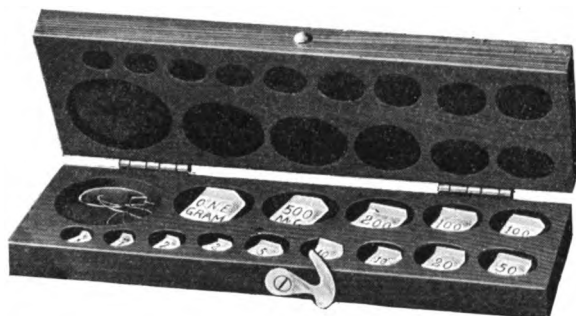
No. 558

- 556 Balance, Hydrometer Scale, with adjustable beam rest and rod inside the pillar, so the beam can be raised 6 to 9 inches higher to weigh liquids in cylinders. Beam 12 inches; pan, 5 inches; capacity, 500 grammes. Price.....\$12.00
- 558 Balance, Hydrometer Scale, for specific gravity weighings. 9-inch beam; 5-inch pans; capacity, 100 grammes..... 6.00

WEIGHTS OF PRECISION

For analytical, assay and scientific purposes. These weights are warranted to be of the very highest standard of accuracy and precision.

AINSWORTH'S



Nos. 560-570

BUTTON WEIGHTS

These metric weights are guaranteed accurate subdivisions of the International Standard Kilogram, as furnished by the Bureau of Standards at Washington.

Error Limit \pm .005 Mg.

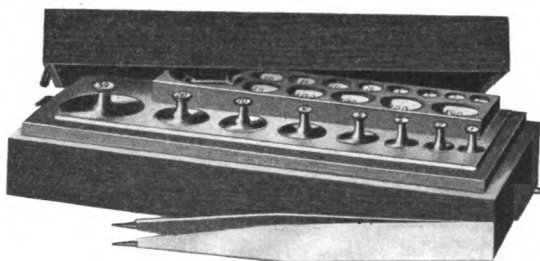
560	One gram (platinum), to 1 mg. and 2 riders.....	\$25.00
562	50 mg. (platinum), to 1 mg. and 2 riders.....	12.00

Error Limit \pm .01 Mg.

564	One gram (platinum), to 1 mg. and 2 riders.....	15.00
566	50 mg. (platinum), to 1 mg. and 2 riders.....	8.00

Ordinary Commercial

568	One gram (platinum), to 1 mg. and 2 riders.....	10.00
570	Bullion or gold weights 500 mg. (platinum), to .5 mg, marked 1000 to 1.....	10.00



Nos. 572-578

ANALYTICAL WEIGHTS

572	10 grammes down to 1 mg. and 2 riders.....	11.00
574	20 grammes down to 1 mg. and 2 riders.....	12.00
576	50 grammes down to 1 mg. and 2 riders.....	14.00
578	100 grammes down to 1 mg. and 2 riders.....	16.00

WEIGHTS OF PRECISION

AINSWORTH'S

No. 580 SINGLE MILLIGRAMME WEIGHTS

GRADE	Milligrammes		1000	500	200	100	50	20	10	5	2	1	
A {	Error limit	}	Price	\$5.00	4.00	3.00	2.00	1.75	1.50	1.25	1.00	1.00	1.00
	+ or —.005 Mg.	}	each										
B {	Error limit	}	Price	\$2.50	1.75	1.50	1.25	1.00	.75	.60	.50	.50	.50
	+ or —.01 Mg.	}	each										
C {	Ordinary	}	Price	\$1.50	1.00	.85	.75	.60	.40	.30	.25	.25	.25
	Commercial.	}	each										
	Bullion wghts.	}	Price	\$1.50	1.00	.85	.75	.60	.40	.30	.25	.25	.25
	1000 = 500 Mg.	}	each										

No. 582 MILLIGRAMME RIDERS

In ordering, state whether eye is parallel or at right angles to legs and on what make of balance they are to be used.

GRADE	Milligrammes	12	10	6	5	3	2	1.2	1	.6	.5
A { Error limit + or —.005 Mg. }		Price	.....	.....	.....	.....	.....	.....	.....	.....	each \$1.00
B { Error limit + or —.01 Mg. }		Price	.....	.....	.....	.....	.....	.....	.....	.....	each .50
C { Ordinary Commercial. }		Price	.....	.....	.....	.....	.....	.....	.....	.....	each .25



Nos. 584-586

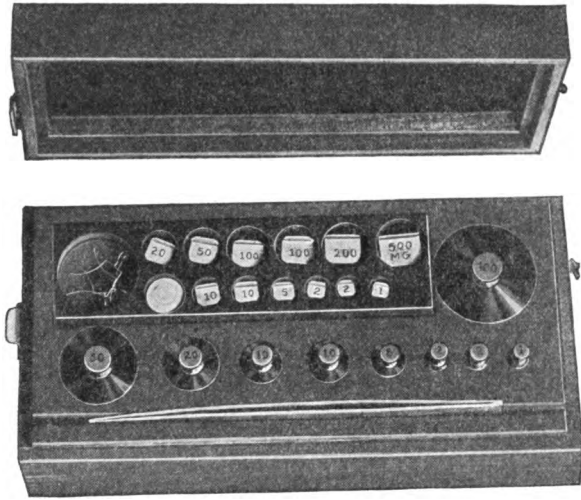
ASSAY TON WEIGHTS

- 584 One Assay Ton to 1—20 (.05), Brass \$4.00
 586 Four Assay Tons to 1—20 (.05), Brass 6.00

The assay ton contains as many milligrammes (29.166) as there are Troy ounces in a ton (2,000 lbs.) avoirdupois; hence, if one assay of ore yields a button weighing one milligramme, the ore carries one ounce to the ton.

WEIGHTS OF PRECISION

TROEMNER'S



No. 588

588

Gramme Weights

1 platinum gramme, down to 1-10 milligramme	\$15.00
1 platinum gramme, down to 1-10 milligramme specially checked	25.00
10 gramme piece, down to 1 milligramme	16.00
20 gramme piece, down to 1 milligramme	17.00
50 gramme piece, down to 1 milligramme and 3 riders	19.00
100 gramme piece, down to 1 milligramme and 3 riders	21.00
200 gramme piece, down to 1 milligramme and 3 riders	25.00
500 gramme piece, down to 1 milligramme and 3 riders	29.00
1000 gramme piece, down to 1 milligramme and 3 riders	34.00

590

Grain Weights, Troy

10 platinum grains, down to 1-100 grain	15.00
10 platinum grains, down to 1-1000 grain	16.00
100 grain piece down to 1-100 grain	16.00
1000 grain piece down to 1-10 grain and 3 riders	17.00
1000 grain piece down to 1-100 grain and 3 riders	18.00
1000 grain piece down to 1-1000 grain and 3 riders	19.00

592

Assay Ton Weights

4 A. T. to 1-20 A. T.	6.00
1 A. T. to 1-20 A. T.	4.00

594

Milligramme Weights, Platinum, Single

Milligrammes	1000	500	200	100	50	20	10	5	2	1
Each	\$3.00	2.00	1.50	1.25	1.00	.40	.30	.25	.25	.25

596

Milligrammes Weights, Fractional

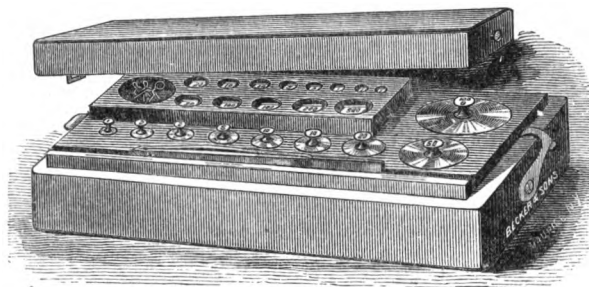
Set comprising one ½ milligr., two 1-5 milligr., one 1-10 milligr.	1.00
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598

Riders, Single

Milligrammes	12	10	6	5	2	1	½
Each	\$0.25	.25	.25	.25	.40	.40	.50

BECKER'S FINE WEIGHTS



No. 600

600 **Gramme Weights, Becker's.** In French polished boxes lined with velvet, every piece fitted separately and adjusted to the utmost accuracy; brass weights lacquered; the fractions of the gramme are platinum, except those below 20 milligrammes, which are made of aluminum.

No. 1	1 platinum gramme, down to 1-10 milligramme	\$10.60
No. 2	10 gramme piece, down to 1-10 milligramme	12.00
No. 3	20 gramme piece, down to 1 milligramme and 3 riders	14.00
No. 4	50 gramme piece, down to 1 milligramme and 3 riders	16.00
No. 5	100 gramme piece, down to 1 milligramme and 3 riders	18.00
No. 6	200 gramme piece, down to 1 milligramme and 3 riders	24.00
No. 7	500 gramme piece, down to 1 milligramme and 3 riders	28.00
No. 7A	1000 gramme piece, down to 1 milligramme and 3 riders	35.00

602 **Gramme Weights, Becker's Imported.**

No. 1	1 gramme down to 1-10 milligramme	9.00
No. 2	10 gramme down to 1-10 milligramme	11.00
No. 3	20 gramme down to 1 milligramme and 3 riders	12.00
No. 4	50 gramme down to 1 milligramme and 3 riders	14.00
No. 5	100 gramme down to 1 milligramme and 3 riders	16.00

604 **Assay Ton Weights, Becker's.**

4 A. T. to 1-20 A. T.	6.00
1 A. T. to 1-20 A. T.	4.00

606 **Milligramme Weights, Becker's, Single.**

Milligramme	500	200	100	50	20	10	5	2	1
Ordinary, each	\$1.25	.75	.75	.50	.35	.35	.35	.30	.30
Specially checked, each	\$2.00	1.25	1.00	.75	.50	.50	.50	.50	.50

608 **Riders, Single, Becker's.**

Milligrammes	12	10	6	3	2	1 2-10	1	6-10
Price each	\$0.30	.30	.30	.35	.35	.50	.50	.50

THOMPSON BALANCE CO. WEIGHTS

"BLUE SEAL" FLAT WEIGHTS FOR GOLD ASSAYING

Error limit + or — .005 milligram.

610	1 gram (platinum) down to 1 milligram and 2 riders.....per set	\$25.00
612	50 milligram (platinum) down to 1 milligram and 2 riders.....per set	12.00

"RED SEAL" FLAT WEIGHTS FOR SILVER ASSAYING

Error limit + or — .01 milligram.

614	1 gram (platinum) down to 1 milligram.....per set	15.00
616	100 milligrams (platinum) down to 1 milligram.....per set	8.00

ORDINARY COMMERCIAL WEIGHTS

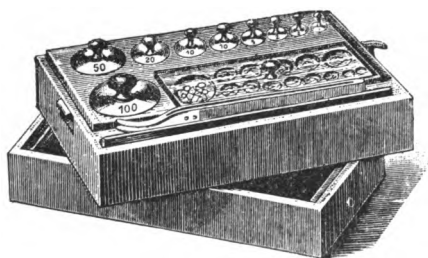
618	1 gram (platinum) down to 1 milligram and 2 riders.....per set	10.00
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No. 620 PRECISION WEIGHTS AND RIDERS—Separately

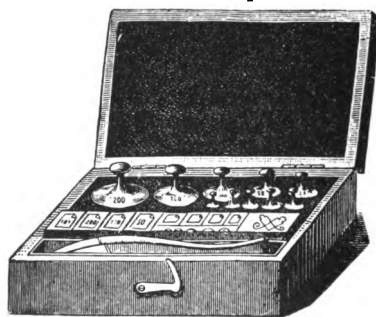
"Blue Seal" Error Limit + or — .005 mg.	"Red Seal" Error Limit + or — .01 mg.	"Ordinary Commercial" Error Limit + or — .015
1 mg.....each, \$1.00	1 mg.....each, \$0.75	1 mg.....each, \$0.30
2 mg.....each, 1.00	2 mg.....each, .75	2 mg.....each, .30
3 mg.....each, 1.00	3 mg.....each, .75	3 mg.....each, .30
5 mg.....each, 1.00	5 mg.....each, .75	5 mg.....each, .30
10 mg.....each, 1.25	10 mg.....each, .75	10 mg.....each, .30
20 mg.....each, 1.50	20 mg.....each, .75	20 mg.....each, .30
30 mg.....each, 1.50	30 mg.....each, .75	30 mg.....each, .30
50 mg.....each, 1.75	50 mg.....each, .90	50 mg.....each, .50
100 mg.....each, 2.00	100 mg.....each, 1.00	100 mg.....each, .75
200 mg.....each, 2.50	200 mg.....each, 1.25	200 mg.....each, 1.00
300 mg.....each, 3.50	300 mg.....each, 1.75	300 mg.....each, 1.35
500 mg.....each, 4.00	500 mg.....each, 2.25	500 mg.....each, 1.75
1000 mg.....each, 5.00	1000 mg.....each, 3.25	1000 mg.....each, 2.75

ASSAY TON WEIGHTS

622	One assay ton down to 1-20 A. T.....per set	\$4.00
624	Four assay ton down to 1-20 A. T.....per set	6.00



No. 626



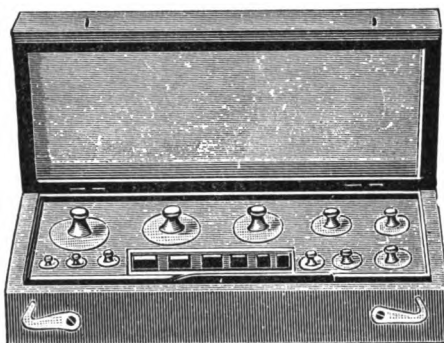
No. 626

626 **Gramme Weights, Analytical, Imported.** Of the very highest standard of accuracy and precision, either in hinged box or in box with loose cover.

50 grammes down to 1 milligramme and 3 riders, platinum-plated.....each	15.00
100 grammes down to 1 milligramme and 3 riders, platinum-plated.....each	18.00
50 grammes down to 1 milligramme and 3 riders, gold-plated.....each	12.00
100 grammes down to 1 milligramme and 3 riders, gold-plated.....each	15.00

WEIGHTS OF PRECISION

FOR CHEMICAL, PHARMACEUTICAL AND OTHER
ACCURATE PURPOSES



No. 636

- 628 **Milligramme Weights.** German silver. From 5 down, of aluminum, 500 milligrammes and down to 1 milligramme.....per set **\$1.00**
- 630 **Gramme Weights, Oertling's.** In round, ivory box, screw lid, one gramme to 1 milligramme, with six 1-milligramme riders...per set **12.00**
- 632 **Riders, Oertling's.** 1 milligramme..... **.25**
- 634 **Gramme Weights.** Imported; well adjusted. A good quality, which stands between the analytical and cheaper grades, in polished wooden block, to 1 milligramme.
 Set of grammes..... 20 50 100 200 500 1000
 Price..... **\$1.75 2.00 2.50 3.50 5.00 7.50**
- 636 **Gramme Weights.** Same as above, but in polished case, with hinged cover.
 Set of grammes..... 20 50 100 200 500 1000
 Price..... **\$3.00 3.50 4.50 6.00 7.50 10.00**
- 638 **Gramme and Grain Weights, Becker's No. 2.** In mahogany box lined with black velvet. Each piece fitted separately; brass weights lacquered, fractions of the gramme platinum.
 50 grms. down to 1 mg..... **\$ 9.00**
 100 grms. down to 1 mg..... **10.00**
 1000 grms. down to 1 100 gr..... **10.00**
 100 grms. down to 1 cgm..... **5.50**
 500 grms. down to 1 cgm..... **9.50**
 1000 grms. down to 1 cgm..... **12.00**
- 640 **Gramme Weights, Becker's No. 2.** In mahogany block.
 500 grms. down to 1 gm..... **6.00**
 1000 grms. down to 1 gm..... **8.50**

WEIGHTS OF PRECISION



No. 642

642 Gramme Weights. In polished mahogany box.

20 grammes to 1 centigramme.....	\$ 3.50
50 grammes to 1 centigramme.....	5.00
100 grammes to 1 centigramme.....	6.00
500 grammes to 1 centigramme.....	10.00
1 kilogramme to 1 centigramme.....	12.00

644 Gramme Weights. Brass; in block.

20 grammes down to 1 centigramme.....	.60
50 grammes down to 1 centigramme.....	1.00
100 grammes down to 1 centigramme.....	1.50
500 grammes down to 1 gramme.....	2.50
1000 grammes down to 1 gramme.....	4.00
2000 grammes down to 1 gramme.....	6.00

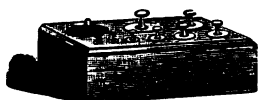
646 Metric Weights. Of japanned iron; loose.

1 kilogramme down to 10 grammes.....	1.25
2 kilogrammes down to 10 grammes.....	2.00
5 kilogrammes down to 10 grammes.....	3.50
10 kilogrammes down to 10 grammes.....	7.00

648 Troy Weights. Brass; in mahogany box, lined with velvet. All small weights are of aluminum, fitted separately.

One 1-oz. piece down to $\frac{1}{4}$ grain.....	3.50
Two 2-oz. piece down to $\frac{1}{4}$ grain.....	6.25
One 5-oz. piece down to $\frac{1}{4}$ grain.....	7.75
One 10-oz. piece down to $\frac{1}{4}$ grain.....	10.00
One 20-oz. piece down to $\frac{1}{2}$ grain.....	15.00
One 50-oz. piece down to $\frac{1}{2}$ grain.....	20.00
Two 100-oz. piece down to 1 grain.....	30.00
One 200-oz. piece down to 1 grain.....	40.00

WEIGHTS



No. 650



No. 654



No. 658

650 Troy Block Weights of Solid Brass. In cherry block.

1 oz. down to $\frac{1}{2}$ grain.....	\$1.00
2 oz. down to $\frac{1}{2}$ grain (two).....	1.75
5 oz. down to $\frac{1}{2}$ grain.....	2.50
10 oz. down to $\frac{1}{2}$ grain.....	4.00

652 Troy Block Weights of Brass. Highly finished; in ash block.

20 oz. down to $\frac{1}{2}$ grain.....	7.00
30 oz. down to $\frac{1}{2}$ grain.....	9.00
50 oz. down to $\frac{1}{2}$ grain.....	12.50

654 Troemner's Troy Cup Weights.

4 oz. down to $\frac{1}{4}$ oz.....	1.50
8 oz. down to $\frac{1}{4}$ oz.....	3.00
16 oz. down to $\frac{1}{4}$ oz.....	4.00
32 oz. down to $\frac{1}{4}$ oz.....	5.50
64 oz. down to $\frac{1}{4}$ oz.....	9.00

656 Aluminum Gramme Weights.

1 gramme down to 1 centigramme.....set	.40
--	-----

658 Troy Aluminum Grain Weights.

5 grains down to $\frac{1}{2}$ grain.....set	.25
--	-----



No. 660

660 Troy Aluminum Grain Weights. Square, made concave, so they can be picked up readily.

10 grains down to $\frac{1}{2}$ grain.....set	.40
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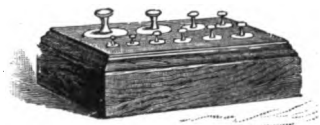
662 Troemner's Decimal Troy Weights, Brass.

Set of 4-10, 3-10, 2-10, 1-10, 5-100, 4-100, 3-100, 2-100, 1-100 oz.....	2.50
--	------

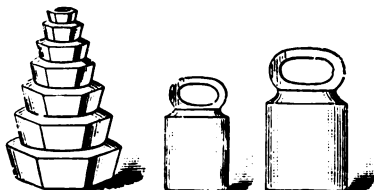
664 Decimal Troy Grain Weights.

50 grains down to 10 grains, nickel silver.....set	.60
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WEIGHTS

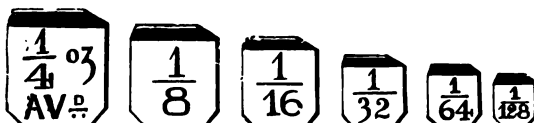


No. 666



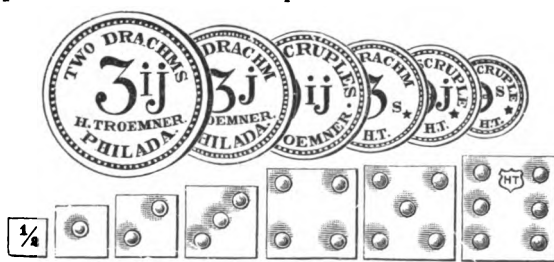
Nos. 670-672

- 666 **Avoirdupois Weights, Brass.** In walnut block.
- | | | |
|----------------------------------|---------|--------|
| 1 lb. down to $\frac{1}{8}$ oz. | per set | \$2.50 |
| 2 lbs. down to $\frac{1}{8}$ oz. | per set | 3.75 |
| 4 lbs. down to $\frac{1}{8}$ oz. | per set | 7.00 |
- 668 **Avoirdupois Weights, Brass.** Standard quality, in oiled walnut block, lined with poplar to prevent shrinkage; weights of the highest finish; burnished.
- | | | |
|----------------------------------|---------|------|
| 1 lb. down to $\frac{1}{4}$ oz. | per set | 4.00 |
| 2 lbs. down to $\frac{1}{4}$ oz. | per set | 5.50 |
| 4 lbs. down to $\frac{1}{4}$ oz. | per set | 7.00 |
- 670 **Avoirdupois Brass Cased Weights.**
- | | | |
|----------------------------------|---------|------|
| 1 lb. down to $\frac{1}{2}$ oz. | per set | 1.25 |
| 2 lbs. down to $\frac{1}{2}$ oz. | per set | 1.75 |
| 4 lbs. down to $\frac{1}{2}$ oz. | per set | 3.00 |
- 672 **Avoirdupois Iron Weights.** Japanned, loose.
- | | | |
|---|---------|------|
| 1 lb. down to $\frac{1}{2}$ oz. | per set | .75 |
| 2 lbs. down to $\frac{1}{2}$ oz. | per set | 1.00 |
| 4 lbs. down to $\frac{1}{2}$ oz. | per set | 1.50 |
| 8 lbs. down to $\frac{1}{2}$ oz. (15 lbs.) | per set | 3.00 |
| 10 lbs. down to $\frac{1}{2}$ oz. (25 lbs.) | per set | 4.00 |



No. 674

- 674 **Avoirdupois, Fractions of Ounces.** Of nickel silver.
- | | | |
|---|---------|-----|
| $\frac{1}{4}$ oz. down to 1-128 avoirdupois oz. | per set | .75 |
|---|---------|-----|



No. 676

- 676 **Prescription Weights.** Of nickel silver and brass.
- | | | |
|---|---------|-----|
| 2 drachms, down to $\frac{1}{2}$ grain. | per set | .25 |
| 6 grains, down to $\frac{1}{2}$ grain. | per set | .10 |
- 678 **Gold Weights.** 10 pennyweights, down to $\frac{1}{2}$ grain per set .50
- 680 **Sugar Weights.** 13.024, 26.048 or 52.096 grammes each 1.00
- 682 **Sugar Weights.** Set of 2, in lined box, normal and $\frac{1}{2}$ normal 2.25
- 684 **Sugar Weights.** Set of 3, in lined box, $\frac{1}{2}$ normal and double normal 4.50

ANEROID BAROMETERS

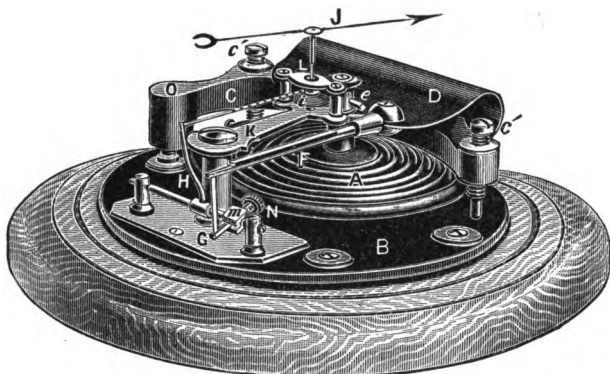


Fig. 1

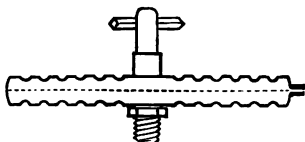


Fig. 2

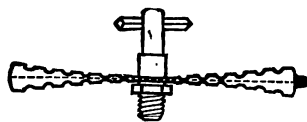


Fig. 3

ATMOSPHERIC PRESSURE

The atmosphere surrounding the earth may be regarded as an "Ocean" of air, extending upwards from the earth's surface about ten miles above sea level. Its greatest density is nearest to the earth's surface, by reason of having to support the weight of its whole depth; and it gradually becomes less dense as the distance from the earth increases. This law of decrease in pressure being known, is used as a means of measuring the height of hills and mountains.

ANEROID

The word Aneroid is a Greek compound, expressing "without fluid." Aneroid Barometers are frequently termed "holosteric" barometers, but this is merely a fancy name to distinguish our present form of flat spring ("D") instrument from the older and less perfect spiral spring form.

CONSTRUCTION—VACUUM CHAMBER, "A"

The illustration (Fig. 1), shows the general construction of the movement with its elastic metallic box, called the vacuum chamber, "A."

This chamber is constructed with two circular discs of thin corrugated German silver, firmly soldered together at the edges, forming a close box, as shown in Fig. 2. The air is exhausted from this box, which causes the top and bottom discs to close together, as shown in Fig. 3. The pressure of air upon the outside surfaces of an ordinary size chamber is equal to a force of about 60 pounds.

The vacuum chamber, "A," is firmly fixed to the circular metal base, "B," by a post upon its center, projecting through the base plate.

BRIDGE, "C"

An iron bridge "C," spans the chamber, resting upon the base plate by means of the two pointed screws, c'c'. (These screws are used to finely regulate the tension upon the chamber, "A".)

To the bridge "C," is fixed the mainspring, "D," which is forced down by mechanical means sufficient to insert the knife edge piece, "E."

ANEROID BAROMETERS

As this knife edge is fastened (by means of a central pillar) to the top disc of chamber "A," the mainspring, "D," when released, lifts the upper part of the chamber, drawing the two discs asunder so that the box again has the appearance as shown in Fig. 2.

As this forms a perfect balance (the power of the mainspring opposing the atmospheric pressure upon the vacuum chamber), any variation in air-pressure will now be shown by a movement up or down of the elastic chamber. A decrease in pressure will allow the mainspring to overcome the power of the vacuum, the action then being upwards, and an increase of air-pressure will produce the contrary result.

INDICATING HAND SHOWS RESULTS

This vertical action of the vacuum chamber is multiplied and converted to a horizontal movement of the indicating hand by a series of mechanical movements as follows:

Being attached to the mainspring, the lever, "F," is actuated by the movement of the chamber. It is attached to the short lever, "G," and again to the long lever, "H." From it, a fine chain extends to the center of the movement, passing around a central arbor or spindle, "I," upon which the indicating Hand, "J," of the Barometer is fixed, now having a horizontal motion, parallel to the Dial. The projecting arm, "K," carrying two small pillars, with a cross piece, "L," supports the central arbor or spindle.

The short lever, "G," projects from regulator, "M," and is provided with an adjusting screw, "N." This, being capable of lengthening or shortening the lever, provides an adjustment by which the indicating Hand of the Barometer may be set to the correct position upon the Dial. This is done by turning the adjusting screw which passes through the base plate at the extremity of the bridge, ("O").

ADJUSTMENT

As there is sometimes a settlement of some of the metal parts and springs which alters the position of the indicating hand, it is advisable, whenever an opportunity offers, to compare the readings of an Aneroid with a standard Mercurial Barometer. If they do not agree, the Aneroid may be adjusted by turning the small adjusting screw until the indicating hand on the dial coincides with the height of the mercury column.

COMPENSATED

In the best made instruments the main lever, "G," is made of a composite bar of two metals, steel and brass, the quantity of each metal being altered until it is correctly compensated, for any change in temperature. This averts the necessity of making allowances for changes in temperature, as is necessary in reading a Mercurial Barometer.

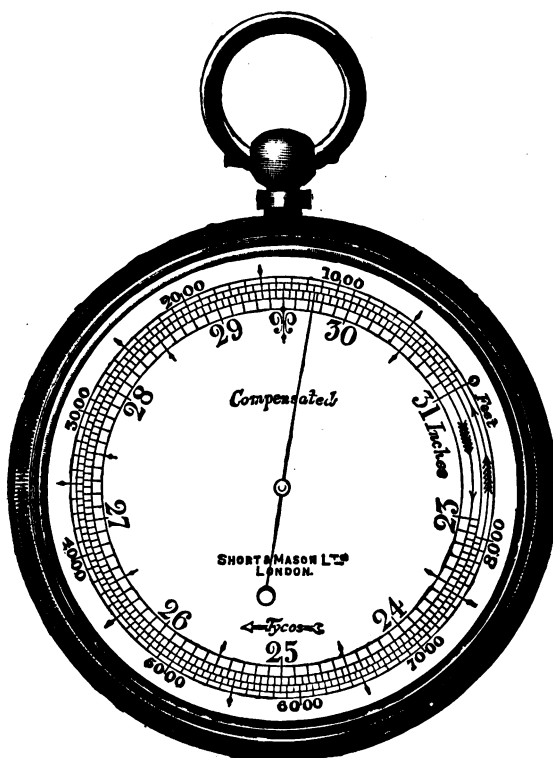
IN GENERAL USE BY OBSERVERS

The Aneroid, owing to its portable form and great sensitiveness in responding to changes in pressure of the atmosphere (it will denote a change much quicker than the Mercurial Barometer), is to-day in more general use by observers of meteorological changes than any other form of Barometer.

ADVANTAGES

The Aneroid is indispensable to the navigator, as the motion of a ship renders a Mercurial Barometer so unsettled. In measuring altitudes, owing to its portability, sensitiveness and the ease with which approximate results may be obtained, it is highly valuable to the Engineer and Surveyor, while the Tourist, with the Aneroid, notes his gain in elevation foot by foot, as well as plans his excursions in accordance with prognostications from its readings.

POCKET SIZE ANEROIDS



Nos. 686-690

Pocket Size Aneroid, Gold-Plated Cases, Silvered Metal Dials, Compensated for Temperature, in Morocco Cases

		SIZE, INCHES	
		1¾	2½
686	Altitude range, 8,000 feet, in 50-foot divisions.....each	\$19.25	\$20.50
688	Altitude range, 12,000 feet, in 50-foot divisions.....each	20.95	22.20
690	Altitude range, 16,000 feet, in 100-foot divisions.....each	22.55	23.80
692	Leather sling case, in lieu of Morocco, additional.....	1.70	2.10

In order to prevent rust, all "S. & M." Pocket Aneroids have the movement gold-plated and lacquered.

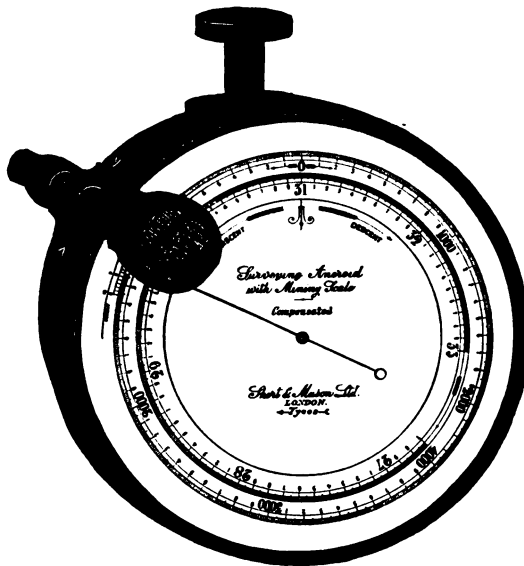
If interested in other ranges or sizes, write for complete descriptive booklet.

All "S. & M." Pocket Aneroids are adjusted in such a manner as to prevent derangement if taken beyond the altitude engraved on the scale.

We are prepared to quote prices for duty-free importation on all classes of goods for educational institutions.

SPECIAL SURVEYING ANEROID BAROMETERS

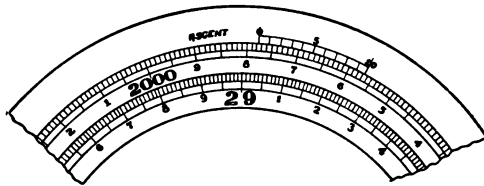
Very sensitive and strong, most practical form for close and accurate readings.



Nos. 694-700

The Illustration Shows Full Size Section of the Circle with Vernier, for the 3-inch Size.

THE VERNIER



Special Surveying Aneroid Barometers, best quality only, compensated for temperature.

Stout bronzed metal case, silvered metal dial, with Vernier scale moved by rackwork motion, reading lens arranged to traverse the entire circle. In solid leather sling case.

Diameter.....	inches	3	5
694 Altitude scale range, 3,000 feet.....		\$66.20	71.20
696 Altitude scale range, 6,000 feet.....		63.00	68.00
698 Altitude scale range, 12,000 feet.....		67.50	72.50
700 Altitude scale range, 16,000 feet.....		69.40	74.40
Extra for aluminum cases.....		5.00	7.00

Altitude Readings on "S. & M." Surveying Aneroids

The following altitude scales are arranged by Vernier to read to single feet of elevation:

3-inch.....3,000 feet
5-inch.....3,000 feet, 6,000 feet

All higher altitude scales will read by Vernier to 2 feet of elevation.

MERCURIAL BAROMETERS

IMPROVED MERCURIAL BAROMETER FOR
SCHOOLS AND COLLEGES

Medium Grade

Oak board, inch scale (26 to 31 inches) and metric scale (66cm to 78cm). Double Vernier, black oxidized finish, silver deposited figures $\frac{3}{8}$ -inch bore, sliding scale to allow for changing level of mercury in the cistern. Screw attachment for blocking the mercury. Total length 39 inches, F. and C. thermometer. For use in an altitude from sea level to 3,000 feet.

	Divisions	Double Vernier	Price Each
702	$\frac{1}{10}$ inch	$\frac{1}{100}$ inch	\$20.00
	$\frac{1}{10}$ cm	$\frac{1}{10}$ mm	

Extras for Above

Scale reading lower than 26 inches.

Symbol	Barometer, Inches	For use in altitude of	Add to list price Each
A	24 to 31	5,000 feet	\$2.00
B	21 to 31	8,000 feet	3.00
D	18 to 31	12,000 feet	4.00
E	16 to 31	16,000 feet	5.00

LIBRARY BAROMETER

Common Grade

Oak frame, inch scale (26 to 31 inches) with thermometer. Black oxidized finish, silver deposited figures, $\frac{3}{8}$ -inch bore. Total length 42 inches sliding metal pointer.

704 Divisions $\frac{1}{10}$ of an inch.....each \$10.00

No. 702

No. 704

Baskets, Wire. See Wire, page 412, Nos. 3854-3856.

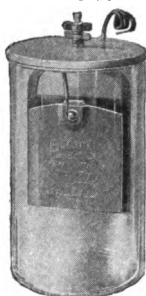
NOTE: If goods are to be packed for mule back, kindly so specify in ordering.

EDISON-BSCO PRIMARY BATTERIES

Edison-Bsco Cells are equally suitable for open circuit (intermittent discharge) or closed circuit (continuous discharge). It is important that the proper number of cells be used to furnish the necessary working voltage and that the type selected be large enough to deliver the current required. In cases where the flow of current will be comparatively high (3 to 5 amperes) or where the circuit will be closed continuously at other than very low current rates, cells of high capacity should be selected, as the larger types have low internal resistance and long life, thus giving best results at lowest maintenance cost.

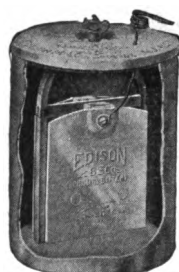
The open circuit, or initial voltage of all cells is .95 volt per cell; but in all batteries the initial voltage is higher than the effective or working voltage on continuous closed circuit. The high initial voltage is effective for work only when cells are discharged at an extremely low current rate, and in some cases, such as with ordinary dry cells, even at low rates of discharge it is available only for intermittent contacts of short duration.

TYPE 401



No. 706

TYPE 403



No. 708

706 Type 401. Formerly known as Type 1. Adapted for railway signals, crossing bells, battery motors, telephone train dispatchers' talking circuits, etc. Capacity, 400 ampere hours.

Size over all, $6\frac{3}{4} \times 12\frac{3}{4}$ inches; complete, with porcelain jar each \$4.00
 Size over all, $6\frac{3}{4} \times 12\frac{3}{4}$ inches; complete, with heat-resisting glass jar each 4.20

Renewals

Complete renewal each 2.00
 Zinz-oxide, assembled each 1.90
 One can caustic soda each .24
 One bottle special battery oil each .06

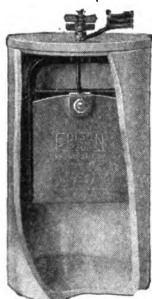
708 Type 403. Formerly known as Type 3. Adapted for railway crossing signals, mine signals, electro-plating, fire alarms, burglar alarms, programme and self-winding clocks, small common battery telephone exchanges, private branch exchanges, intercommunicating telephone systems, telephone interrupters, supervisory lamps, trunk line relays, telephone train dispatchers' talking circuits, etc. Capacity, 400 ampere hours.

Size over all, $7\frac{1}{2} \times 11$ inches; complete, with porcelain jar each 3.60

For renewals, see Type 401.

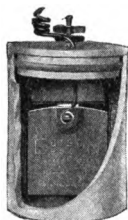
EDISON-BSCO PRIMARY BATTERIES

TYPE 309



No. 710

TYPE 206



No. 712

TYPE 208



No. 714

710 Type 309. Adapted for battery fan motors, small battery motors, programme and self-winding clocks, burglar alrms, fire alarms, electro-plating, chemical analysis and other school work, bell systems, etc. Also for various telephone purposes. Will give slightly greater effective capacity than Type 305, because of the better location of plates in the electrolyte. Capacity, 300 ampere hours.

Size over all, $5\frac{3}{4} \times 12\frac{3}{4}$ inches; complete, with porcelain jar each \$3.30

Renewals

Complete renewal	each	1.80
Zinc-oxide assembled	each	1.70
One can caustic soda	each	.20
One bottle special battery oil	each	.06

Porcelain jars will be shipped unless otherwise specified.

Types 305 and 309 cells or renewals can be furnished with special low temperature electrolyte instead of the standard caustic soda, at an increase of 35 cents in the list price per cell or renewal.

712 Type 206. Formerly known as as Type 6, with porcelain jar and hollow rubber gasket ring. Adapted for motor boats running on salt water. Use five cells for single cylinder make-and-break engines; six cells for multiple cylinders, high speed, make-and-break engines. Use eight cells for jump-spark. Cover is fitted with a hollow rubber gasket to prevent splashing. Capacity, 200 ampere hours.

Size over all, $5\frac{3}{4} \times 9$ inches; complete, with porcelain jar each 2.40

Renewals

Complete renewal	each	1.50
Zinc-oxide assembled	each	1.40
One can caustic soda	each	.16
One bottle special battery oil	each	.06

714 Type 208. Formerly known as Type 8. Adapted for stationary gas or gasoline engines, small motors, burglar alarms, bell systems, programme and self-winding clocks, annunciators, electric time stamps mine signals, intercommunicating telephone systems, talking circuits for way-station telephones in railway, train dispatching systems, etc. Use five cells for stationary engines, having make-and-break ignition. Use eight cells for stationary engines having jump-spark ignition. Cell has flat cover, without gasket, and is recommended only for stationary work. Capacity, 200 ampere hours.

Size over all, 6×9 inches; complete, with porcelain jar each 2.20

For renewals, see Type 206.

BATTERIES



No. 716



No. 720

716 Batteries, Bunsen's. With rolled zincs.

Size	1 qt.	2 qts.	1 gal.
Jars..... inches	4x5	5x6	6x8
Cell, complete.....	\$1.20	\$1.50	\$3.00
Parts:			
Carbon .....	.10	.20	.40
Carbon connection .....	.20	.30	.60
Carbon clamp .....	.10	.15	.40
Glass jar .....	.25	.30	.40
Porous cup .....	.15	.20	.30
Zinc and connection .....	.60	.70	1.00

SUGGESTIONS FOR SETTING UP BUNSEN CELLS

The zinc should be well amalgamated, the porous cup filled with diluted nitric acid, and the glass jar with water to within one cm. ($\frac{3}{8}$ in.) of the top of the porous cup. For stronger action, a small amount of sulphuric acid may be added to the water in the jar, using not more than one part of sulphuric acid to twelve of water

718 Batteries, Crowfoot. Gravity.

Cell, complete.....	\$1.00
Parts:	
Copper, 6-inch.....	.15
Zinc, with hanger and connection.....	.50
Jar, 6x8 inches.....	.50

SUGGESTIONS FOR USING CROWFOOT CELLS

In this cell, after placing the elements in position, fill jar nearly full with water, then drop in crystals of copper sulphate, about 500 grams to each cell. The elements should be connected for a short time before using until a distinct separation is seen in the fluid of the cell, the lower part being of a deep blue coloration, and the upper colorless. If it is desired to hasten this action, add a saturated solution of zinc sulphate to the upper liquid. The line between the blue and the colorless solutions should be about midway between the zinc and the copper; when it is lower than this a small amount of sulphate of copper should be added to the cell. If higher the cell should be put on a short circuit until this mark is reached, or a portion of the copper sulphate solution may be drawn out, and the cell re-filled with water.

720 Batteries, Daniell's.

Cell, complete.....	\$2.00
Parts:	
Copper with pocket.....	.80
Porous cup .....	.40
Glass jar, 6x8 inches.....	.50
Zinc.....	.50
Zinc clamp.....	.20

SUGGESTIONS FOR USING DANIELL CELLS

After placing elements in position fill the porous cup with a diluted solution of sulphuric acid, one part acid to 20 or 25 parts of water, or with a 25% aqueous solution of zinc sulphate. The glass jar outside the porous cup to be filled with a saturated solution of copper sulphate, and the pocket of the copper should be filled with copper sulphate to keep the solution saturated.

BATTERIES



No. 722



No. 726

722 Batteries, Leclanche. "Gonda" cell.						
	Cell, complete.....					\$1.25
	Gondas, only.....					.50
	Zincs, only.....					.10
724 Batteries, Leclanche. Porous cup cell.						
	Cell, complete.....					1.00
	Porous cup, only.....					.50
	Zincs, only.....					.10
726 Batteries, Grenet. French form.						
	Capacity.....	½ pt.	1 pt.	1 qt.	½ gal.	½ gal. dble.
	Cell, complete.....	\$1.20	1.80	2.50	4.00	6.00
	Carbons, each.....	\$0.20	.30	.40	.50	.50
	Zincs, each.....	\$0.15	.20	.25	.30	.30



No. 728

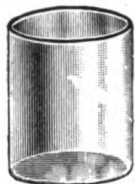


Nos. 730-732

728 Batteries, National No. 2.		
	Cell, complete.....	\$1.50
	Parts; carbon vase.....	1.00
	Zinc, cylindrical.....	.25
	Glass jar.....	.25
For telephones, electric bells, signals, gas engines, gasoline engines, etc.		
730 Batteries, "Red Seal" No. 6, or A. Igniter, 2½x6, very efficient.....		.40
732 Batteries, "Red Seal" No. 8, or C. Igniter, 3½x8, very high grade.....		1.00

Dry batteries in quantities at lower prices.

BATTERY SUNDRIES



No. 734



No. 738



No. 740

734	Battery Jars. Round, of glass.								
	Width.....in.	4	4½	5	5	6	6	8½	9
	Height.....in.	4	5	6	7	6	8	12	15
	Each.....	\$0.20	.25	.30	.40	.40	.50	1.25	1.75
736	Battery Cells. Porous, round cups.								
	Width.....in.	2	2½		2⅝	3	3		3
	Height.....in.	3	4½		5¼	5½	7		8
	Each.....	\$0.15	.18		.20	.22	.25		.30
738	Battery Connections. Binding screws. Finished.								
	Single.....							each	\$0.10
	Double.....							each	.15
740	Battery Connectors. Brass, double.....							each	.20



No. 742



No. 744



No. 746

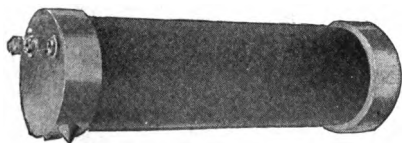


No. 748

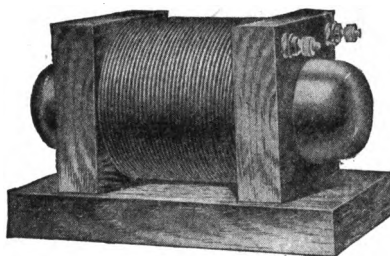
742	Battery Double Connectors. For two wires.		
	Small.....	each	.05
	Large.....	each	.10
744	Battery Binding Posts. Double, with plate to screw to table.....	each	.35
746	Battery Binding Posts. With wood screw.		
	Single.....	each	.15
	Double.....	each	.20
748	Battery Binding Posts. American pattern.		
	Small.....	each	.05
	Medium.....	each	.08
	Large.....	each	.10

Battery Hydrometers. See Hydrometers, page 268, Nos. 2454-2458.

BATTERY SUNDRIES



No. 750



No. 752

- | | | |
|-----|--|--------|
| 750 | Spark Coils, No. 1. For gasoline engines..... | \$1.70 |
| 752 | Spark Coils, No. 2. Gas engine coil..... | 3.50 |
| 754 | Bulldog Battery Connectors. Can be instantly removed without tools. always gives perfect contact and cannot rattle. Cable is soldered, supported and cannot break. Each..... | .10 |
| | Per box of 10 | .75 |



No. 754

- | | | |
|-----|--|-----|
| 756 | Columbia Battery Connectors. This connector obviates all possibility of loose and unsatisfactory battery connections. It consists of a short length of flexible insulated wire, on each end of which is attached the terminals which is a punched copper tip, to which is attached a soft rubber gasket or washer. | |
| | Each..... | .05 |
| | Per dozen..... | .40 |



No. 758



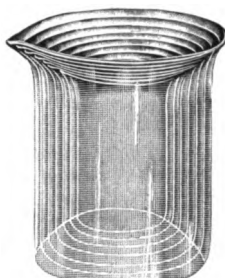
No. 760

- | | | |
|-----|--|------|
| 758 | Pocket Ammeter. Showing the amount of current in batteries..... | 2.00 |
| 760 | Pocket Combination Volt-Ammeter. Invaluable for testing the voltage and the amperage contained in a battery..... | 2.50 |
- Induction Coils. See page 274, No. 2562.

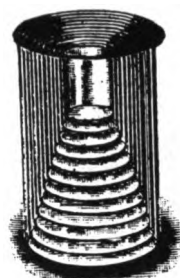
BEAKERS



Nos. 762-766



No. 768



No. 770

762 Beakers, Aluminum. With lip.

Capacity.....cc.	125	250	500	1000
Price.....each	\$0.60	.80	1.20	1.60

764 Beakers, Copper. Polished, heavy, with lip.

Capacity.....cc.	125	250	500	1000
Price.....each	\$0.55	.75	1.00	1.25

766 Beakers, Nickel-plated.

Capacity.....oz.	4	8	16	32
Price.....each	\$0.70	.90	1.10	1.50

768 Beakers, Glass. Bohemian, squat form, with lip.

No.....	000	00	0	1	2	3	4	5
Capacity....oz.	$\frac{1}{2}$	$1\frac{1}{2}$	3	5	8	12	18	24
Price.....each	\$0.07	.09	.10	.12	.18	.25	.30	.40
No.....	6	7	8	9	10	11	12	
Capacity....oz.	36	50	64	80	96	112	144	
Price.....each	\$0.50	.60	.70	.80	.90	1.00	1.20	

770 Beakers, Glass. Bohemian, tall form, no lip.

No.....	000	00	0	1	2	3	4	
Capacity....oz.	$\frac{1}{2}$	1	2	3	6	8	14	
Price.....each	\$0.05	.07	.08	.10	.12	.17	.22	
No.....	5	6	7	8	9	10		
Capacity....oz.	20	28	38	50	65	80		
Price.... each	\$0.25	.30	.35	.40	.55	.65		

772 Beakers, Glass. Wide with pourout Griffin's form—Whitall Tatum Co's. make.

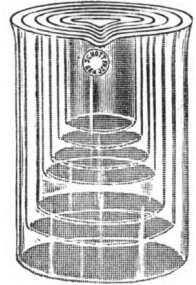
No.				Each	Per Doz.
0000	1 oz.	30 cc.	$1\frac{7}{8} \times 1\frac{3}{8}$ ins.	\$0.18	\$1.75
000	2 oz.	60 cc.	$2\frac{1}{8} \times 1\frac{3}{8}$ ins.	.18	1.75
00	3 oz.	90 cc.	$2\frac{1}{4} \times 1\frac{7}{8}$ ins.	.20	2.00
0	4 oz.	120 cc.	$2\frac{3}{4} \times 2$ ins.	.21	2.10
0A	5 oz.	150 cc.	$2\frac{3}{4} \times 2\frac{1}{4}$ ins.	.22	2.20
1	6 oz.	180 cc.	$3\frac{1}{8} \times 2\frac{1}{4}$ ins.	.23	2.25
2	8 oz.	250 cc.	$3\frac{3}{8} \times 2\frac{1}{2}$ ins.	.25	2.50
2A	10 oz.	300 cc.	$3\frac{5}{8} \times 2\frac{3}{4}$ ins.	.28	2.75
3	12 oz.	350 cc.	$3\frac{7}{8} \times 3$ ins.	.32	3.15
3A	16 oz.	500 cc.	$4\frac{1}{4} \times 3\frac{1}{4}$ ins.	.38	3.75
4	20 oz.	600 cc.	$4\frac{5}{8} \times 3\frac{3}{8}$ ins.	.40	4.00
5	24 oz.	700 cc.	$5 \times 3\frac{5}{8}$ ins.	.45	4.50
6	32 oz.	1000 cc.	$5\frac{3}{4} \times 4$ ins.	.70	7.00
7	48 oz.	1400 cc.	$6\frac{1}{8} \times 4\frac{3}{8}$ ins.	.85	8.50
8	64 oz.	2000 cc.	$7\frac{5}{8} \times 4\frac{3}{4}$ ins.	1.10	11.00

BEAKERS

774 Beakers, Jena Glass.

SQUAT FORM WITH LIP

Capacity...cc	50	100	150	250	400	600	800	1000
Height...mm	55	60	75	85	100	115	135	145
Diameter...mm	45	50	55	65	75	85	95	105
Price....each	\$0.13	.14	.15	.18	.25	.30	.35	.40

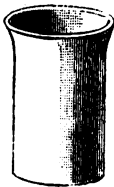


No. 774

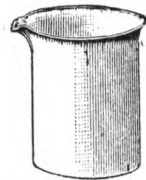
JENA LABORATORY GLASSWARE

The Jena Laboratory Glass Appliances are made of a material which possesses a greatly increased power of resisting sudden changes of temperature and the action of corrosive chemicals. This glass is therefore much safer and more reliable for laboratory use in chemical and physical research than any other glass hitherto employed for the same purpose.

Tests made at the Physical Institute of the University of Jena have shown that the Jena Laboratory Glass may be employed without hesitation for heating liquids over a powerful Bunsen flame without wire-gauze. This, as compared with the same flame used with wire-gauze, represents a saving of approximately 58 per cent of time and 60 per cent of gas.



No. 776



No. 778

776 Beakers. Royal Berlin porcelain, glazed, plain.

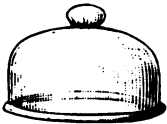
No.....	1	2	3	4
Capacity, oz.....	6	12	20	32
Price, each.....	\$0.45	\$0.75	\$0.95	\$1.40

778 Beakers. Royal Berlin porcelain, glazed, lipped.

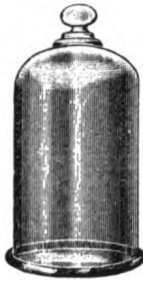
No.....	1	2	3	4
Capacity, oz.....	4	6	8	12
Price, each.....	\$0.40	\$0.50	\$0.60	\$0.70

Note. Can also supply cheaper porcelain beakers in cheaper grade, if requested.

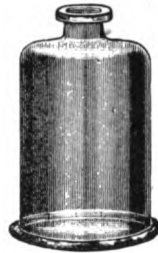
BELL GLASSES AND BELLS



No. 780



No. 782



No. 784

780 Bell Glasses. Low form, with knob and ground bottom.

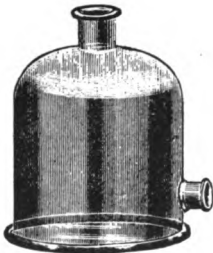
Inside diam.....in.	4	6	8	10	12
Inside height.....in.	2¾	4	5	7½	9
Each.....	\$0.60	.90	1.35	1.75	2.40

782 Bell Glasses. Regular form, with knob and ground bottom.

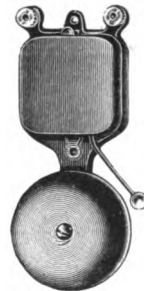
Inside diam.....in.	2¾	4	5	6	7	10
Inside height.....in.	6	7½	9	11½	12	13½
Capacity.....gal.	⅛	¼	½	1	2	3
Each.....	\$0.50	.70	.90	1.20	1.40	3.00

784 Bell Glasses. With tubulature at top.

Inside diam.....in.	6	8
Inside height.....in.	8	12
Each.....	\$1.25	2.85



No. 786



No. 788

786 Bell Glasses. With tubulatures at top and near bottom.

Inside diam.....in.	6	8
Inside height.....in.	8	12
Each.....	\$1.50	2.50

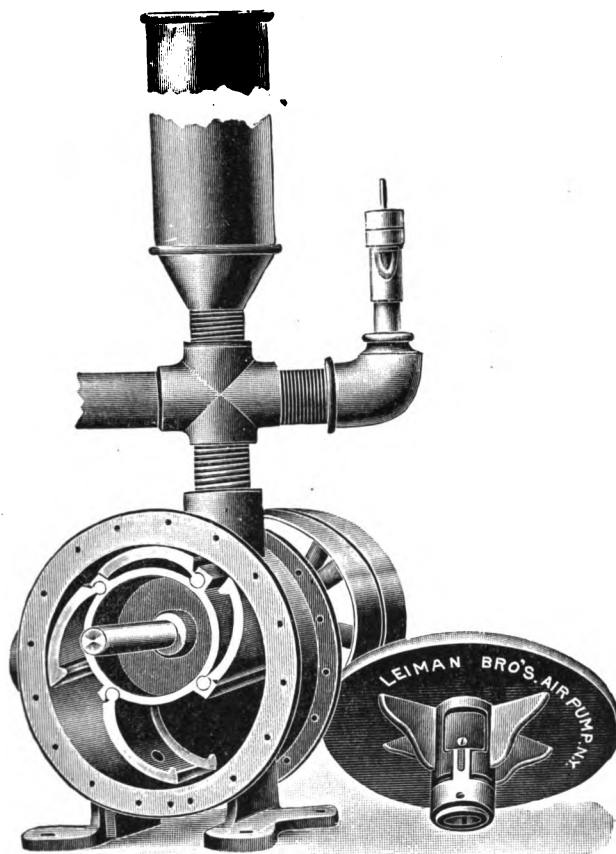
788 Bells, Electric. Iron box, nickel-plated

Size.....in.	2½	3
Each.....	\$0.40	.50

Blast Lamps. See Burners, pages 110-112-113.

Binding Posts. See Battery Connections, page 74, Nos. 738-748.

PATENTED HIGH PRESSURE BLOWERS



They are simply constructed and have no delicate parts to wear out or cause trouble. All parts are interchangeable, and can be duplicated at small cost. Does not require the services of a mechanic to take the machine apart or assemble it.

Runs noiseless in operation whether new or old and without vibration.

They run at a slow speed and require very little power to drive them.

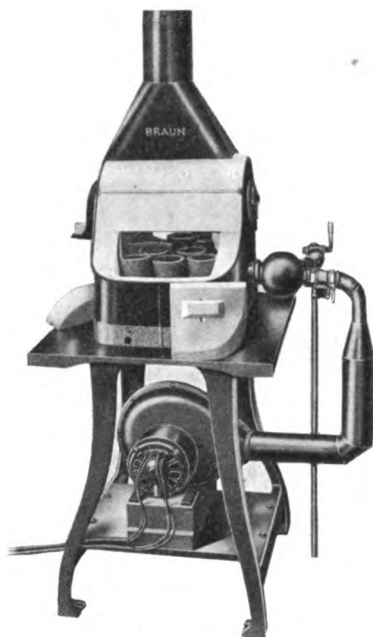
No. 790

	A	B	C	D	E	F	G	H
Size of blower	17	30	80	200	400	675	1400	2592
Cu. in. per rev.	600	600	400	300	250	200	200	200
Max. lbs. pressure, sq. in.	10	10	10	10	10	10	10	10
Diam. of pulleys, inches	3	4	5	7	12	12	14	20
Face of pulleys, inches	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	2	2 $\frac{1}{4}$	3	3	3
App. H. P. min. pressure	$\frac{1}{2}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	1	1 $\frac{1}{2}$	2 $\frac{1}{2}$	..
Inlet and outlet, inches	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	2	2 $\frac{1}{2}$	4
Weight, crated, pounds	23	40	61	112	173	287	436	578
Floor space, inches	10x6	12x8	15x10	19x15	24x18	28x22	31x24	.....
Price	\$18.50	25.00	32.50	50.00	61.00	90.00	145.00	265.00

The following are a few of the purposes of these blowers now in use:

Melting of metals, removing paint, hardening, annealing, atomizing, sand blasting, soldering, fuel oil plants, cleaning, glass blowing and bending, agitating liquids, tempering, forging, brazing, pneumatic service, testing gas fixtures, burning brands, in laboratories, etc., etc.

BLOWERS



No. 792

Illustration shows rotary flame combination furnace No. 40 with gas burner and combination motor and blower.

COMBINATION MOTORS AND BLOWERS

The combination motor and blower shown in illustration is especially designed for use with the Braun Gas Burner. It is made in the most substantial way possible. The motor will develop more power than is required by the blower, which insures it a long life and freedom from overheating.

This combination motor and blower will easily operate three gas burners. The cost of operating is very low, being practically the same as that of a sixteen candle power electric light.

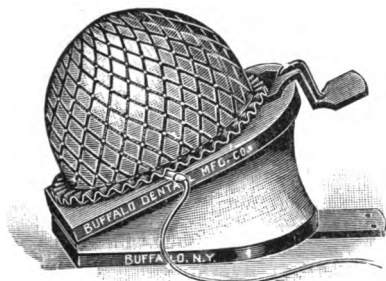
These blowers are made to operate on either 110 or 220 voltage for both alternating and direct currents.

In ordering please state voltage if direct current is to be used, and the voltage and cycles if the alternating current is to be used.

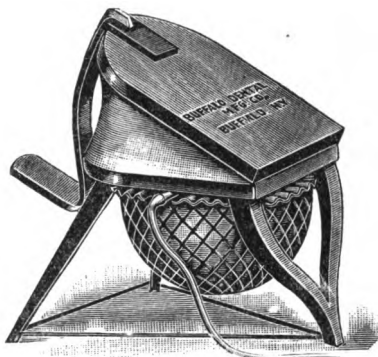
Net weight, 80 lbs. Shipping weight, 110 lbs.

	Price
Direct Current , (not including connections).....	\$40.00
Alternating Current , (not including connections).....	50.00
Blower , arranged for belt power	15.00
Air Pipe , galvanized sheet iron, 4 inches diameter, per foot .....	.20
Air Pipe Elbows , galvanized sheet iron, 4 inches diameter, each.....	.60
Reducing Connection , for connecting air pipe to burner valve, each.....	.40

BLOWERS



No. 794



No. 796

794 **Blowers, Fletcher's Foot Bellows.** Gives a continuous blast of air.

No.....	9	9A	9B
Diameter..... inches	7 $\frac{3}{4}$	10	11
No. of discs	1	2	3
Each	\$5.00	7.00	11.50

796 **Blowers, Fletcher's Foot Bellows.** Mounted on legs.

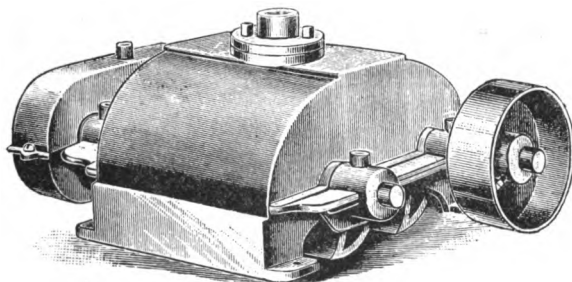
No.....	10	10A	10B
Diameter..... inches	7 $\frac{3}{4}$	10	11
No. of discs	1	2	3
Each	\$6.00	8.00	12.50

798 **Blowers.** Extra rubber disk for Nos. 9 or 10, 9 inches each \$0.75

For No. 9A or 10A, 12 inches each 1.15

For No. 9B or 10B, 15 inches each 1.65

800 **Blowers.** Extra nets for above..... .35

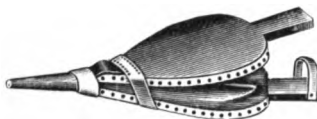


No. 802

802 **Blowers, Root's Positive.**

$\frac{1}{4}$ size, 4x1 $\frac{3}{4}$ pulley, 1 $\frac{1}{2}$ -inch outlet	20.00
3 $\frac{1}{2}$ size, 8x2 pulley, 2-inch outlet	40.00
4 size, 10x3 pulley, 3-inch outlet	66.00

BLOWERS



No. 804



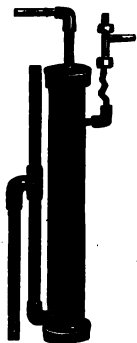
No. 806

804 Blowers, Hand Bellows.

Diam.....	in.	8	10	12
Each		\$1.25	1.50	1.75

806 Blowers, Hand.

Composed of two pure gum rubber bulbs, one covered with net, for continuous blast, each \$1.50



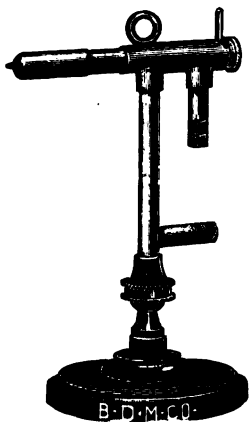
Nos. 808-810



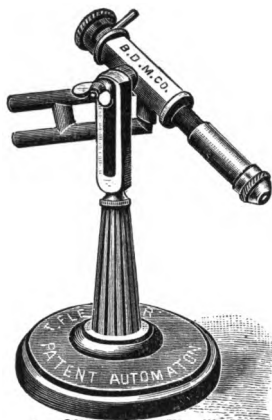
No. 812

- 808 Blowers, Richard's Water Blast. Direct connection is made with Richard's Filter Pump, producing simultaneously vacuum and blast.
Without filter pump, each \$7.50
- 810 Blowers, Richard's. Complete with filter pump, each 9.00
- 812 Blowers, Muencke's Water Blast and Exhauster. Nickered brass, with air outlet and water regulating stop-cock, each 10.00
With vacuum gauge, extra 5.00

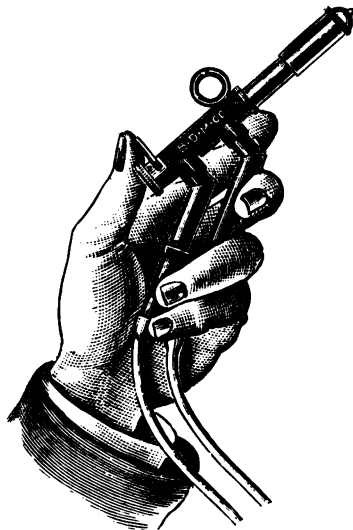
BLOW PIPES



No. 814



Nos. 816-818



Nos. 820-822

FLETCHER'S BLOW PIPES

814 This blow pipe is mounted on a stand, with a universal ball joint, so as to enable it to be used at any angle or in any position. It is simple, self-adjusting, for both gas and air, requiring only a slight motion of a small lever to obtain instantly any flame from the smallest to the largest. It is made for coal gas only.

All automatons have the delicacy of the best mouth blow pipe used with the utmost skill, with the power and advantages obtained with a mechanical blower.

Price.....each \$4.00

816 and 818 are for illuminating gas only. The swivel gives even greater latitude of adjustment than the No. 814 is capable of, while the blow pipe is easily detached and capable of use in the hand.

816 Automaton 6D on Standard..... \$4.50

818 Automaton 6E on Standard..... 6.00

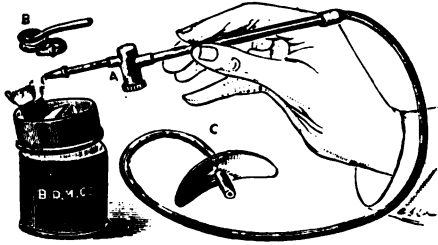
820 and 822 are for illuminating gas only. The engraving shows the hand blow pipe with both air and gas tubes underneath, forming a most convenient pattern for small work, brazing, annealing, etc. The No. 6B is of the same size as No. 6A, and requires a $\frac{3}{8}$ -inch bore gas pipe and tap. No. 6C is similar in construction to the No. 6B, but larger, and requires for its fullest power a $\frac{1}{2}$ -inch clear-bore gas pipe and tap, and is adapted for the heaviest brass finishers' and bicycle makers' work.

820 Automaton No. 6B, for $\frac{3}{8}$ -inch Gas Pipe..... \$3.50

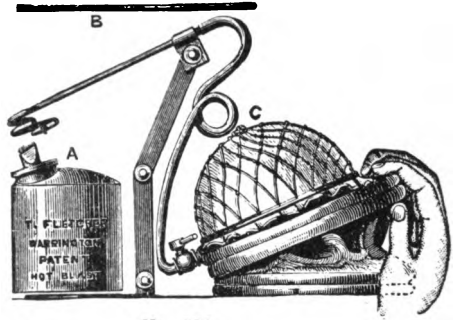
822 Automaton No. 6C, for $\frac{1}{2}$ -inch Gas Pipe..... 5.00

NOTE — Nos. 6B and 6C Automaton Hand Blow Pipe will be found a most convenient pattern for small work, brazing, annealing, etc. The No. 6B requires a $\frac{3}{8}$ -inch bore gas pipe and tap. The No. 6C requires for its fullest power a $\frac{1}{2}$ -inch clear-bore gas pipe and tap. The No. 6B requires blower No. 9A; No. 6C requires blower No. 9B.

BLOW PIPES



No. 824



No. 826

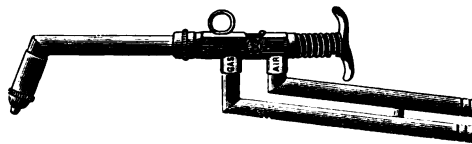
824 Blow Pipe, Fletcher's Patent No. 42. The arrangement of the Fletcher Blow Pipe (No. 42) is totally different from that of any other made. The ordinary form has been entirely discarded, and every detail has been specially designed from practical experience as to the requirements of users. The Mouthpiece is, of all, the easiest to use, and the heaviest continued blowing causes no strain on the lips, whilst the tongue has the necessary control over the opening. The blow pipe proper is held as a pencil. The chamber on the stem stops all condensed moisture and prevents the heat traveling up the shaft. With Cold Blast and Hot Blast, Two Jets, Nickel-plated Mouthpiece\$1.50

826 With folding stand adjustable at any height or angle. It can be used either with the mouth, or the small hand-blower can be attached and the blowing done by pressure of the fingers. With this blow pipe is supplied one jet with and one jet without the hot blast coil, to enable a large variety of flame to be obtained. The lamp or a weight should be placed on the stand when in use.

Blow Pipe, alone\$1.00

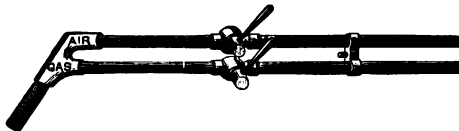
Complete as Illustrated 5.00

As Illustrated, but without Lamp, in case for the Pocket 4.00



No. 828

828 Automatic Blow Pipe. For Light Soldering, length, 10 inches.....\$2.00



No. 830

830 Blow Pipe. Small size, in Brass, with two Stop Cocks, $\frac{1}{8}$ -inch Air Tube and $\frac{1}{16}$ -inch Gas Tube; Length, 14 inches..... \$2.50

BLOW PIPES



No. 832

832 Blow Pipe, Fletcher's No. 30. Taper Shaft, Brass..... \$0.65



No. 834

834 Blow Pipe, Fletcher's No. 30A. Straight Shaft, Brass..... .55



No. 836

836 Blow Pipe, Fletcher's No. 30B. Straight Shaft with Mouthpiece75



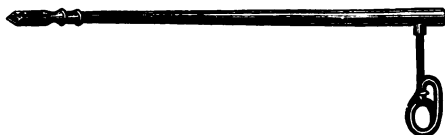
No. 838

838 Blow Pipe, Fletcher's No. 30C. Jointed with Hot and Cold Blast Jets. 1.00



No. 840

840 Blow Pipe, Fletcher's No. 30F. With Moisture Bulb and Mouthpiece..... 1.60



No. 842

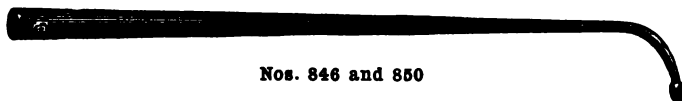
842 Blow Pipe, Fletcher's No. 31. Chemical Blow Pipe with Mouthpiece..... 1.25



Nos. 844 and 848

844	Blow Pipe, Jewelers' Form. Brass with Air Chamber.			
	Size.....	inches	8	10
	Price.....	each	\$0.20	.25
				.30
846	Blow Pipe, Jewelers' Form. Brass without Air Chamber.			
	Size.....	inches	8	10
	Price.....	each	\$0.15	.20
				.25

BLOW PIPES



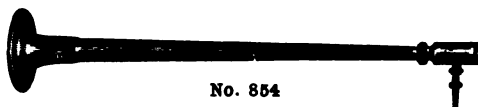
Nos. 846 and 850

848	Blow Pipes, Jewelers'. Nickel-plated, with air chamber.			
	Size.....	inches	8	10
	Price.....	each	\$0.25	.30
850	Blow Pipes, Jewelers'. Nickel-plated, without air chamber.			
	Size.....	inches	8	10
	Price.....	each	\$0.20	.25



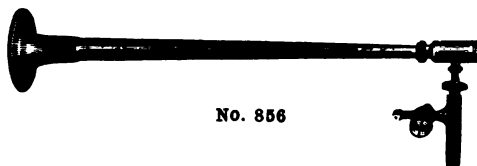
No. 852

852	Blow Pipe, School of Mines Pattern. With moisture trap, made of brass with bone mouthpiece.....	\$0.50
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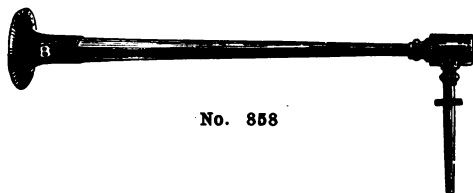
No. 854

854	Blow Pipe, Plattners'. Nickel-plated, with mouthpiece and platinum tip....	3.00
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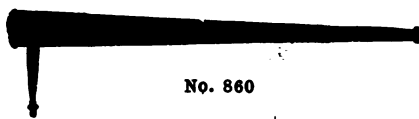


No. 856

856	Blow Pipe, Plattners'. Nickel-plated, with hard rubber mouthpiece and blast attachment for gas.....	2.50
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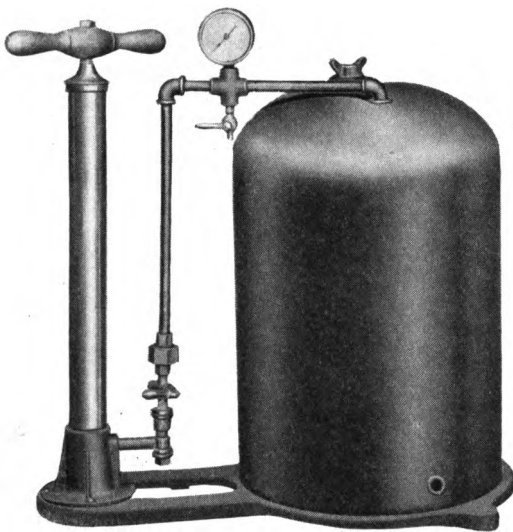
No. 858



No. 860

858	Blow Pipe, Berzelius'. Brass, with mouthpiece and platinum plate.....	1.50
860	Blow Pipe, Black's Conical Form. With movable brass tip.....	.20
862	Blow Pipe Jet Tips. Brass, for all Fletcher's Mouth Blow Pipes.....	.10
864	Blow Pipe Tips. Pure platinum, for Plattners' Blow Pipes, approximately...	1.25
866	Blow Pipe Tips. Brass, for Black's Blow Pipes, approximately.....	.05
868	Blow Pipe Mouthpieces. Hard rubber, trumpet shaped, large, approximately.....	.35
870	Blow Pipe Mouthpieces. Horn, small, approximately.....	.25
	Blow Pipe Goods. According to Prof. Plattners', pages 418, 419, 420.	

PRESSURE OR BLOW PIPE TANKS FOR HYDRO-CARBON BURNERS

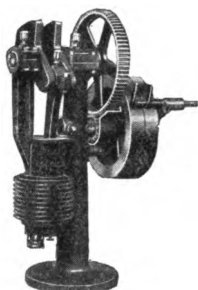


No. 872

- 872 Furnace Blow Pipe, Capacity, 8 Gallons.** This size is the most popular and is the one recommended except for use with the smallest furnaces. It will contain enough gasoline for an entire day's run, leaving sufficient air space to avoid too frequent pumpings. The outfit consists of a pressed steel seamless tank, tested to 200 pounds pressure, tinned inside and out to prevent rusting; the tank is mounted on a removable cast iron base with a brass pump of large capacity, equipped with intake and outlet check valves and cock. The price includes a pressure gauge, 12 feet of $\frac{1}{4}$ -inch black pipe in 3-foot lengths, nipples, elbows, tees, couplings, swivel joint, air cock, globe valve and fittings sufficient to operate one or more burners at once. Shipping weight, 75 pounds; price without burner,.....\$20.00
- 874 Furnace Blow Pipe, Capacity, 2 Gallons.** Similar to No. 872. Price includes 9 feet of $\frac{1}{4}$ -inch black pipe, nipples, elbows, tees, couplings, air cock and globe valve. Shipping weight, 50 pounds; price without gauge and burner 14.00
- 876 Furnace Blow Pipe, Capacity, 4 Gallons.** Similar to No. 872. Equipment same as for 8-gallon outfit. Shipping weight, 60 pounds; price without burner or pressure gauge..... 16.00
- 878 Furnace Blow Pipe, Capacity, 15 Gallons.** Similar to No. 872, but especially recommended for places with a large volume of work where several burners are operated at once. Equipment same as 8-gallon outfit. Shipping weight, 90 pounds; price without burner..... 25.00
- 880 Pump, Hand for Air.** Brass of large capacity, same as on blow pipe outfit illustrated No. 872; complete with inlet and outlet check valves and cock..... 6.00
- 882 Inlet and Outlet Check Valves, and Cock for above, extra.** If a duplicate of an old set is wanted, send the old one with order if possible.
Price 1.50

PUMPS AND FITTINGS FOR BLOW PIPE TANKS

No. 884



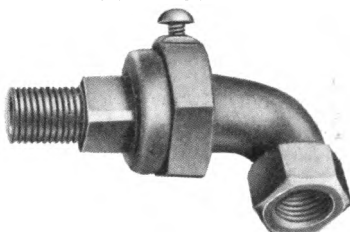
No. 884

CLASS N AIR COMPRESSORS

Plain—Water Cooled

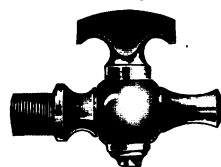
Diameter of Cylinder	2 inches
Length of Stroke	3 inches
Cubic feet per minute at max. speed	1.09
Crank Speed	200 R. P. M.
Working pressure	75 pounds
Outlet	$\frac{1}{4}$ inch pipe
Size pulleys	8x1 $\frac{1}{4}$ inch belt
Horse power required at 75 pounds pressure	$\frac{3}{4}$ 0
Price	\$28.00

SWIVEL JOINT



No. 886

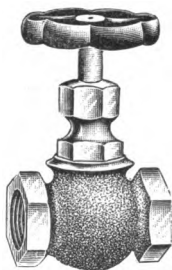
AIR COCK



No. 890

886 Swivel Joint with Elbow. With one male and one female thread.				
Size $\frac{1}{4}$ inch .....				.75
888 Same as above, but straight, with two male threads .....				.75
890 Air Cocks. Size	inches	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$
Price	each	\$0.40	.45	.50
				.60

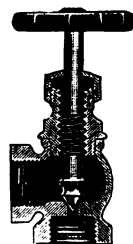
BRASS VALVES



No. 892



No. 894

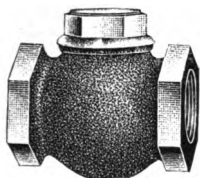


No. 896

892 Globe Valve. With metal seat for use with gasoline, $\frac{1}{4}$ inch	\$0.72
894 Angle Valve. For same usage, $\frac{1}{4}$ inch .....	.72
896 Needle Globe Valve. $\frac{1}{4}$ inch	1.25

BLOW PIPE TANK APPARATUS

CHECK VALVES



No. 898



No. 900

898	Horizontal check valves, metal seat, $\frac{1}{8}$ -inch.....	\$0.65
	$\frac{1}{4}$ -inch.....	.65
900	Vertical check valves, metal seat, $\frac{1}{8}$ -inch.....	.72
	$\frac{1}{4}$ -inch.....	.72

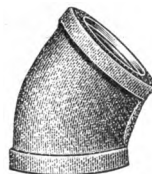
FITTINGS



No. 902



No. 904



No. 906

FITTINGS, BLACK

		$\frac{1}{8}$ -inch	$\frac{1}{4}$ -inch
902	Elbows, 90°.....	\$0.05	.05
904	Elbows, street.....	...	.10
906	Elbows, 45°.....	....	.06



No. 908



No. 910



No. 912

FITTINGS, BLACK

		$\frac{1}{8}$ -inch	$\frac{1}{4}$ -inch
908	Tees.....	\$0.07	.08
910	Crosses.....	....	.09
912	Bushings, $\frac{1}{8}$ to $\frac{1}{4}$ -inch.....	....	.04

BLOW PIPE TANK APPARATUS

FITTINGS, BLACK



No. 914



No. 916



No. 918

		$\frac{1}{4}$ inch	$\frac{1}{4}$ inch
914	Couplings. Straight	\$0.05	.05
916	Couplings. Right and left .....		.05
918	Couplings. Reducing $\frac{1}{4}$ to $\frac{1}{8}$ inch .....		.05



No. 920



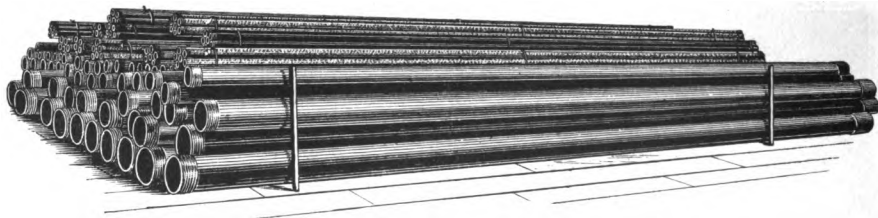
No. 922



No. 924

		$\frac{1}{4}$ inch	$\frac{1}{4}$ inch
920	Unions. Kewanee, with brass seat	\$0.18	.19
922	Nipples, Close .....	.04	.04
924	Nipples, Long.		
	Length, $1\frac{1}{2}$ inches .....	.04	.04
	Length, 2 inches .....	.06	.06
	Length, $2\frac{1}{2}$ inches .....	.06	.06
	Length, 3 inches .....	.06	.06
	Length, 4 inches .....	.07	.07
	Length, 6 inches .....	.10	.10
	Length, 12 inches .....	.19	.19
	Length, 24 inches .....	.25	.25
	Length, 36 inches .....	.30	.30

PIPE



Pipe, black and other sizes of fittings quoted on application. We also carry galvanized fittings and pipe.

REAGENT BOTTLES WITH GROUND GLASS LABELS



Nos. 926-940



Nos. 942-944

These bottles have the chemical names and equivalents distinctly blown in the glass, thus avoiding the danger of confusion and the unsightly appearance of paper-labelled bottles, also the heavy expense of bottles with engraved letters.

All letters ground to make them perfectly visible. Any names not found in the list can be engraved on the bottles at small extra charge.

Please order by number.

926. Reagent Bottles. Capacity $\frac{1}{4}$ pint = 4 oz. = 125 cc. Height $5\frac{1}{4}$ inches
Per dozen, net \$1.75

No.	No.
1. Hydrogen Sulphide (Amb.) H_2S	20. Barium Chloride..... Ba Cl_2
2. Hydrochloric Acid..... HCl	21. Calcium Chloride..... Ca Cl_2
3. Acetic Acid..... $\text{HC}_2\text{H}_3\text{O}_2$	22. Calcium Sulphate..... Ca SO_4
4. Sulphuric Acid..... H_2SO_4	23. Calcium Hydroxide..... Ca (OH)_2
5. Nitric Acid..... HNO_3	24. Magnesium Sulphate..... Mg SO_4
6. Potassium Ferrocyanide..... $\text{K}_4\text{Fe (CN)}_6$	25. Mercuric Chloride..... Hg Cl_2
7. Potassium Sulphocyanide..... K C N S	26. Silver Nitrate (Amber)..... Ag NO_3
8. Potassium Carbonate..... K_2CO_3	27. Lead Acetate..... $\text{Pb (C}_2\text{H}_3\text{O}_2)_2$
9. Potassium Sulphate..... K_2SO_4	28. Ferrous Sulphate..... Fe SO_4
10. Potassium Iodine..... KI	29. Ferric Chloride..... Fe_2Cl_3
11. Potassium Ferricyanide..... $\text{K}_3\text{Fe (CN)}_6$	30. Alcohol..... $\text{C}_2\text{H}_5\text{OH}$
12. Potassium Hydroxide..... KOH	31. Ammonium Sulphocyanide..... NH_4CNS
13. Potassium Dichromate..... $\text{K}_2\text{Cr}_2\text{O}_7$	32. Barium Hydroxide..... Ba (OH)_2
14. Sodium Phosphate..... Na_2HPO_4	33. Barium Carbonate..... Ba CO_3
15. Ammonium Hydroxide..... NH_4OH	35. Ether..... $(\text{C}_2\text{H}_5)_2\text{O}$
16. Ammonia Sulphide (Amb.)..... $(\text{NH}_4)_2\text{S}$	36. Cupric Sulphate..... Cu SO_4
17. Ammonium Chloride..... NH_4Cl	38, 39, 40 Blank
18. Ammonium Carbonate..... $(\text{NH}_4)_2\text{CO}_3$	59. Sodium Carbonate..... Na_2CO_3
19. Ammonium Oxalate..... $(\text{NH}_4)_2\text{C}_2\text{O}_4$	61. Sodium Hydroxide..... NaOH

928 1 set of above 40 bottles, packed in shipping order, net \$ 6.00

930 1 set of above 40 bottles, "Filled with chemically pure Reagents," according to Fresenius; bottles included, net 12.50

REAGENT BOTTLES

932 Reagent Bottles. Same style as 926, capacity 4 oz., per dozen. net \$1.75

No.

- 37. Platinic Chloride. Pt Cl₄
- 58. Fehling's Solution
- 59. Sodium Carbonate. Na₂ CO₃
- 60. Sodium Acetate. NaC₂ H₃ O₂
- 61. Sodium Hydroxide. Na OH
- 77. Ammonia. NH₃
- 81. Stannous Chloride. Sn Cl₂
- 82. Ammonium Molybdate. (NH₄)₂ MoO₄
- 83. Carbon Disulphide. CS₂
- 86. Mercurous Nitrate. Hg₂ (NO₃)₂
- 87. Indigo Solution
- 88. Nessler's Solution
- 90. Magnesia Mixture
- 93. Oxalic Acid. H₂ C₂ O₄
- 94. Picric Acid. C₆ H₂ OH (NO₂)₃
- 96. Potassium Chromate. K₂ Cr O₄

No.

- 97. Ammonium Sulphydrate NH₄ HS
- 100. Mercuric Potassium Iodide
- 401. Barium Nitrate. Ba (NO₃)₂
- 404. Silver Sulphate. Ag₂ SO₄
- 406. Bromine Water
- 407. Chloroform. CH Cl₃
- 408. Cochineal
- 409. Coralline
- 410. Litmus
- 411. Methyl Orange
- 412. Phenolphthalein
- 413. Turmeric
- 414. Iodine Solution. I+KI
- 415. Methyl Alcohol. CH₃ OH
- 416. Sodium Cobaltic Nitrite
- 417. Sodium Hyposulphite. Na₂ S₂ O₃

934 Reagent Bottles. Capacity ½ pt. = 8 oz., 250 cc., height 6½ in., doz. net \$2.25

No.

- 101. Sulphuric Acid, Con. H₂ SO₄
- 102. Sulphuric Acid, Dil. H₂ SO₄
- 103. Nitric Acid, Con. HNO₃
- 104. Nitric Acid, Dil. HNO₃
- 105. Hydrochloric Acid, Con. HCl
- 106. Hydrochloric Acid, Dil. HCl
- 107. Hydrogen Sulphide (Amber)-H₂S
- 108. Ammonium Hydroxide. . NH₄ OH
- 109. Ammonium Chloride. . . NH₄ Cl
- 110. Ammonium Carbonate. (NH₄)₂ CO₃
- 111. Sodium Hydroxide. . . . Na OH

No.

- 112. Sodium Carbonate. . . . Na₂ CO₃
- 114. Barium Chloride. Ba Cl₂
- 116. Blank
- 122. Ammonium Sulphide (Amber) (NH₄)₂ S
- 129. Sodium Phosphate. . . . Na₂ HPO₄
- 130. Ammonium Oxalate. . . (NH₄)₂ C₂ O₄
- 131. Acetic Acid. HC₂ H₃ O₂
- 145. Silver Nitrate (Amber) . Ag NO₃
- 150. Potassium Hydroxide. . KOH
- 151. Calcium Hydroxide. . . . Ca (OH)₂
- 152. Lead Acetate. Pb(C₂ H₃ O₂)₂

936 Reagent Bottles. Capacity 1 pt. = 500 cc., height 7¾ in., doz. net \$3.25

No.

- 204. Ammonium Hydroxide. . NH₄ OH
- 211. Blank
- 215. Sulphuric Acid. H₂ SO₄
- 215A. Sulphuric Acid, Dil. . . H₂ SO₄ + Aq

No.

- 216. Nitric Acid. HNO₃
- 216A. Nitric Acid, Dil. HNO₃ + Aq
- 217. Hydrochloric Acid. . . . HCl
- 217A. Hydrochloric Acid, Dil HCl + Aq

938 Reagent Bottles. Capacity 1 qt. = 1 litre, height 9½ in, doz net \$4.00

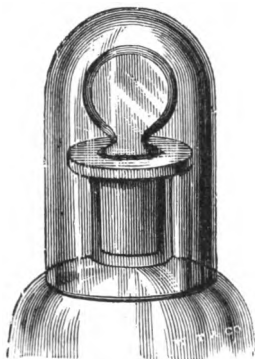
No.

- 501. Sulphuric Acid, Con. . . . H₂ SO₄
- 502. Sulphuric Acid, Dil. . . . H₂ SO₄
- 503. Nitric Acid, Con. HNO₃
- 504. Nitric Acid, Dil. HNO₃

No.

- 505. Hydrochloric Acid, Con. HCl
- 506. Hydrochloric Acid, Dil. HCl
- 511. Blank

REAGENT BOTTLES



No. 946

940 **Reagent Bottles.** Capacity, 1 oz.=30 cc., height, $3\frac{5}{8}$ in., per dozen.....net \$1.25

No.		No.	
325.	Silver Nitrate (Amber)....Ag NO ₃	336.	Gold Chloride.....Au CL ₃
326.	Cobaltous Nitrate.....Co (NO ₃) ₂	341.	Blank.
327.	Platinic Chloride.....Pt CL ₄		

942 **Reagent Bottles.** Wide mouth, capacity, 1 oz.=30 cc., height, $3\frac{1}{8}$ inches, per dozen.....net \$1.35

No.		No.	
350.	Sodium Carbonate.....Na ₂ CO ₃	367.	Potassium Chlorate.....KClO ₃
351.	Borax.....Na ₂ B ₄ O ₇	368.	Potassium Ferricyanide. K ₃ Fe (CN) ₆
353.	Sodium Acetate.....Na C ₂ H ₃ O ₂	369.	Sodium Bitartrate ... Ka HC ₄ H ₄ O ₆
354.	Potassium Nitrate.....KNO ₃	370.	Sodium Nitrate.....Na NO ₃
358.	Potassium Cyanide.....KCN	371.	Starch.
361.	Am. Sod. Phosphate.. Na NH ₄ HPO ₄	372.	Test Paper.
364.	Copper.....Cu	373.	Zinc.
365.	Ferrous Sulphate.....Fe SO ₄	374.	Ammonium Phosphate ..(NH ₄) ₂ HPO ₄
366.	Ferrous Sulphide.....Fe S	375.	Blank.

944 **Reagent Bottles.** Wide mouth, capacity, 4 oz.=125 cc., height, $4\frac{7}{8}$ inches, per dozen.....net \$2.00

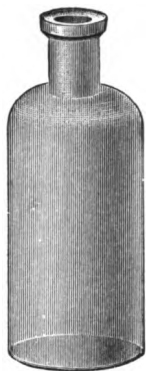
No.		No.	
301.	Sodium Carbonate.....Na ₂ CO ₃	305.	Ferrous Sulphate.....Fe SO ₄
302.	Potassium Nitrate.....KNO ₃	307.	Blank.
303.	Potassium Cyanide.....KCN	312.	Test Paper.
304.	Borax.....Na ₂ B ₄ O ₇	313.	Sod. Ammon. Phosphate.

946 **Reagent Bottle Caps.** To protect stoppers and mouths of bottles from dust.

Size to fit bottles.....oz.	4	8	16	32
Per dozen.....	\$0.80	.90	1.00	1.20

Bottle Rests. See Retorts, page 346, No. 3096.

BOTTLES



No. 948



No. 950

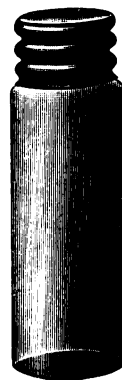


No. 952

948	Bottles. Narrow mouth, flint glass; S. C. "Prescriptions."							
	Capacity.....ounces	1	2	4	8	12	16	32
	Price.....per dozen	\$0.25	.30	.40	.60	.75	.90	1.40
	Capacity....gallons	1/2		1		2		5
	Price.....each	\$0.25		.35		.80		1.50
950	Bottles. Wide mouth, flint glass; S. C., "Powder Bottles,"							
	Capacity....ounces	1/2	1	2	4	8	12	16
	Price....per dozen	\$0.25	.30	.35	.40	.60	.80	1.00
952	Bottles. Extra wide mouth. Flint glass.							
	Capacity.....ounces					1	2	4
	Price.....per dozen					\$0.35	.40	.50

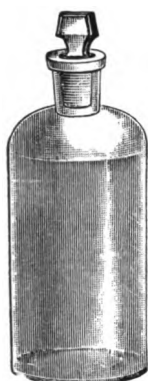


No. 954

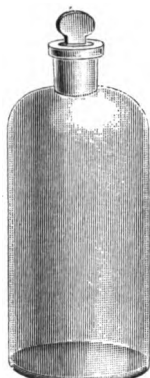


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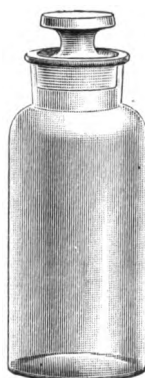
954	Bottles. Extra tall, for oil samples and other liquids.							
	Capacity.....ounces		2		4		8	
	Price.....per dozen		\$0.50		.90		1.20	
956	Bottles. Oil sample, long, with N.P. screw cap, cork lined, 4 oz., dozen							\$1.50
958	Bottles. Homeopathic vials, with patent lip.							
	Capacity.....drams	1/2	1	2	3	4	6	8
	Price.....per gross	\$0.80	.90	1.00	1.20	2.00	3.00	4.00
960	Bottles. With nickel screw caps, round.							
	Capacity.....drams		1		2		4	8
	Price.....per dozen		\$0.25		.30		.40	.50
	Price.....per gross		\$2.00		2.50		3.50	5.00



No. 962



No. 966



No. 968

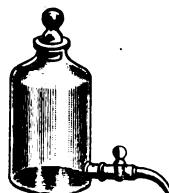


No. 970

962	Bottles, Glass Stoppered.	Flint glass, narrow mouth; S. C. "Tinctures."
	Capacity....oz.	1 2 4 6 8 12 16 32
	Per doz.....	\$1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.50
964	Bottles, Glass Stoppered.	"Tinctures," same as above but of amber glass.
	Capacity....oz.	1 2 4 8 16 32
	Per doz.....	\$1.20 1.40 1.60 2.00 3.00 4.00
966	Bottles, Glass Stoppered.	Green glass; S. C. "Acid Bottles."
	Capacity.....	12 oz. 1 pt. 1 qt. ½ gal. 1 gal. 2 gal.
	Each.....	\$0.15 .20 .25 .35 .50 1.00
968	Bottles, Mushroom Stopper.	Wide mouth; S. C. "Salt Mouths."
	Capacity...	1 oz. 2 oz. 4 oz. 6 oz. 8 oz. 12 oz. 16 oz. 32 oz. ½ gal.
	Per doz....	\$1.10 1.30 1.50 1.70 2.00 2.25 2.75 3.50 5.00
970	Bottles, Mushroom Stopper.	Narrow mouth; S. C. "Tinctures."
	Capacity...	1 oz. 2 oz. 4 oz. 8 oz. 16 oz. 32 oz. ½ gal. 1 gal. 2 gal.
	Per doz....	\$1.00 1.25 1.50 2.00 2.50 3.00 5.00 7.50 15.00
972	Bottles.	Same as above, but of amber glass, for solutions.
	Capacity.....	gallons ½ 1 2
	Each.....	\$0.60 .75 1.50



No. 976



No. 978

974	Aspirator Bottles.	With narrow inlet near bottom, for rubber tubing.
	Capacity....	4 oz. 8 oz. 1 pt. 1 qt. ½ gal. 1 gal. 2 gal.
	Each.....	\$0.35 .40 .50 .70 1.00 1.50 2.50
976	Aspirator Bottles.	With wide outlet near bottom.
	Capacity....	1 qt. ½ gal. 1 gal. 2 gal. 3 gal.
	Each.....	\$0.70 .90 1.50 2.50 3.00
978	Aspirator Bottles.	With glass stopper and stopcock ground into tubulature.
	Capacity....	1 pt. 1 qt. ½ gal. 1 gal. 2 gal.
	Each.....	\$1.80 2.00 2.50 3.50 6.00

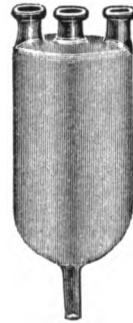
BOTTLES



No. 980



No. 982



No. 986

980	Bottles, Wouff's. With two necks.	Capacity.....	$\frac{1}{4}$ pt.	$\frac{1}{2}$ pt.	1 pt.	1 qt.	$\frac{1}{2}$ gal.	1 gal.	2 gal.
	Each.....		\$0.40	.45	.55	.85	1.25	2.25	4.00
982	Bottles, Wouff's. With three necks.	Capacity.....	$\frac{1}{4}$ pt.	$\frac{1}{2}$ pt.	1 pt.	1 qt.	$\frac{1}{2}$ gal.	1 gal.	2 gal.
	Each.....		\$0.45	.50	.60	.95	1.40	2.50	4.50
984	Bottles, Wouff's. With three necks and tubulature near bottom.	Capacity.....			1 pt.	1 qt.	$\frac{1}{2}$ gal.	1 gal.	2 gal.
	Each.....				\$0.90	1.20	1.75	2.75	5.00
986	Bottles, De-Aerating. As used in sugar factories, for separating the air from the juice.....							each	\$2.00



No. 988



No. 990



No. 992

988	Bottles, Wash, Drechsel's. All glass, for gas, low form.	Capacity.....oz.	4	8	12	16	32
	Each.....		\$0.75	.90	1.00	1.25	1.50
990	Bottles, Wash, Allihn's. All glass, for gas, double action.	Capacity.....oz.	8	16	32	64	
	Each.....		\$1.50	1.85	2.25	3.00	
992	Bottles, Wouff's. With three necks, delivery tubes, and stopper ground in the necks.	Capacity.....oz.	4	8	16	32	
	Each.....		\$1.00	1.25	1.50	2.00	

BOTTLES



No. 994



No. 996



No. 998

994	Bottles, Balsam. With glass cap and loose fitting stopper, capacity, 1 oz.			
	Each.....			\$0.30
996	Bottles, Dropping or Acid. With ball stopper.			
	Capacity.....oz.	1	2	
	Each.....	\$0.45		.50
998	Bottles, Cobalt. With ground-on glass, and long stopper.			
	Capacity.....oz.	1	2	4
	Each.....	\$0.35	.40	.50



No. 1000



Nos. 1002-1004



No. 1006



No. 1008



No. 1012



No. 1010

1000	Bottles, Coin or Acid Test.			
	Capacity.....oz.	1	2	
	Each.....	\$0.30		.40
1002	Bottles, Compressing, Lintner's. For diversions and digestions. Capacity, 4 ounces. Shown above in frame.			
	Each.....			\$0.50
1004	Bottles. Same as above, but with frame, each.....			2.00
1006	Bottles, Dropping. With pipette stopper and rubber bulb.			
	Capacity.....oz.	1	2	
	Each.....	\$0.20		.30
1008	Bottles, Dropping, Ranvier's. With pipette stopper and ball top.			
	Capacity.....oz.	1	2	
	Each.....	\$0.30		.40
1010	Bottles, Dropping, Schuster's. With stopper.			
	Capacity.....oz.	1	2	
	Each.....	\$0.20		.25
1012	Bottles, Dropping. Same as above, but without glass stopper.			
	Capacity.....oz.	1	2	
	Each.....	\$0.15		.20

BOTTLES



No. 1014



No. 1016

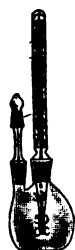


No. 1018



No. 1020

1014	Bottles, Dropping. "Patent Stopper," amber colored.	Capacity.....oz.	1	2		
	Each.....		\$0.25	.35		
1016	Bottles, Mixing. Graduated and glass stoppered.	Capacity.....cc.	250	500	1000	2000
	Each.....		\$1.00	1.50	2.50	4.00
1018	Bottles, Specific Gravity. Unadjusted, for self-adjustment, perforated stopper.	Capacity.....cc.	10	25	50	100
	Each.....		\$0.25	.30	.40	.50
1020	Bottles, Specific Gravity. Accurately adjusted, perforated stopper.	Capacity.....cc.	10	25	50	100
	Each.....		\$0.50	.70	.90	1.10
1022	Bottles, Specific Gravity. With thermometer ground in neck.	Capacity.....cc.	25	50	100	
	Each.....		\$1.75	2.00	2.50	



No. 1024



No. 1026



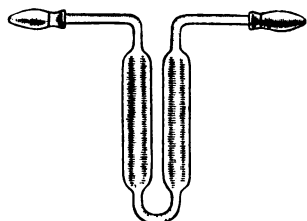
No. 1028



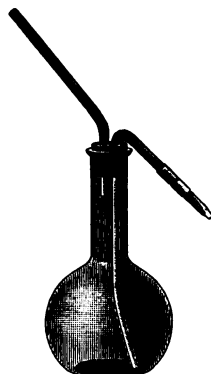
No. 1030

1024	Bottles, Specific Gravity, Geissler's. With thermometer ground in neck, and capillary side tube.	Capacity.....cc.	10	25	50	
	Each.....		\$2.25	2.50	3.00	
1026	Bottles, Specific Gravity. With tare weight, in lacquered tin box.	Capacity.....cc.	10	25	50	100
	Each.....		\$1.25	1.50	2.00	2.50
1028	Bottles, Specific Gravity, Regnault's. With wide mouth for solids.	Capacity.....cc.		25	50	
	Each.....			\$0.50	.60	
1030	Bottles, Specific Gravity, Regnault's. With narrow mouth for liquids.	Capacity.....cc.		25	50	
	Each.....			\$0.40	.50	

BOTTLES



No. 1032

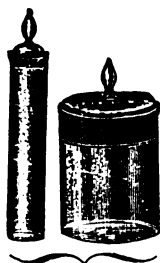


No. 1034



No. 1038

1032	Bottles, Specific Gravity, Sprengel's, plain U shape with Suction Tube.....	\$0.75
1034	Bottles, Washing; Fresenius. Complete with Rubber Stopper.	
	Capacity.....ounces	4 8 12 16 24 32
	Price.....each	\$0.35 .40 .45 .50 .60 .75
1036	Bottles, Washing; Drechsel's, All Glass.	
	Capacity.....ounces	8 16 32
	Price.....each	\$1.00 1.25 1.50
1038	Bottles, Washing; Langbein's, with Two Glass Stop-Cocks.	
	Capacity.....ounces	8 16
	Price.....each	\$2.50 2.75



No. 1040



No. 1042

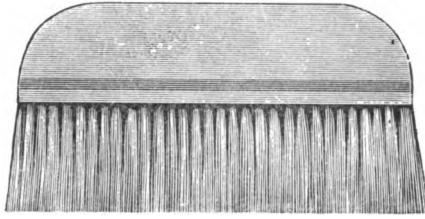


No. 1044

1040	Bottles, Weighing for Filters. Wide Mouth and Ground Hollow Stopper.	
	Height.....mm.	50 50 50 65 75 100
	Diam.....mm.	20 30 40 12 15 25
	Price.....each	\$0.25 .30 .40 .25 .30 .40
1042	Bottles, Weighing, Conical form, with Light Stopper.	
	Capacity.....ounces	1 2 4
	Price.....each	\$0.40 .50 .60
1044	Bottles, Weighing, Two Tubes, one fitting into the other.	
	Length.....mm.	70 75 80
	Diam.....mm.	15 20 25
	Price.....each	\$0.20 .25 .30

329066A

BRUSHES



No. 1046

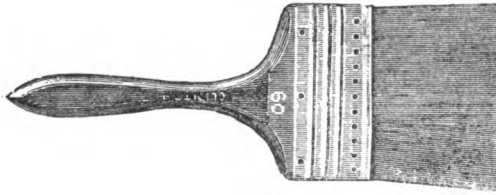
1046 Brushes, Bristle. For buckboard cleaning, flat. Rounded handle, extra quality stiff bristles.

Width.....	inches	8	10
Price.....	each	\$1.00	1.25



No. 1048

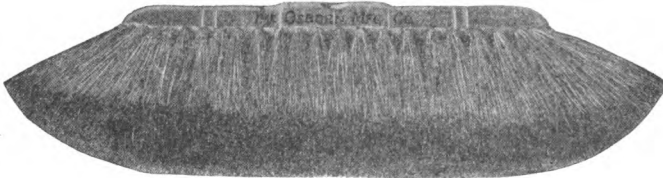
1048 Brushes. For buckboard cleaning.....each .75



No. 1050

1050 Brushes, Bristle. For buckboard cleaning, soft.

Length of brush.....	inches	6	10	10	10
Length of bristle.....	inches	2½	2¾	3½	4
Each.....		\$1.00	1.25	1.50	2.00



No. 1052

1052 Brushes, Floor. Used by a number of schools and assay offices throughout the country, being especially adapted to meet the exacting demands of school boards. Russia bristle. 16 inches long, trim 3½ inches.

Each.....\$2.00



No. 1054

1054 Brushes. For scouring bullion. Double end. Steel or brass.....each .50

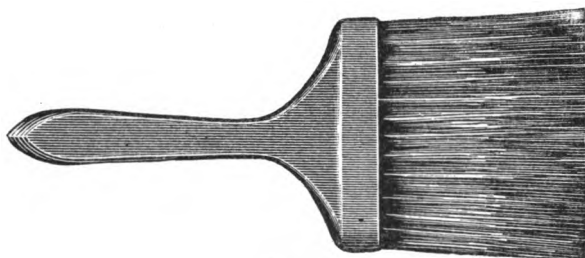
BRUSHES



No. 1056

1056 Brushes, Camel Hair Flat, hard rubber bound, wooden handle.

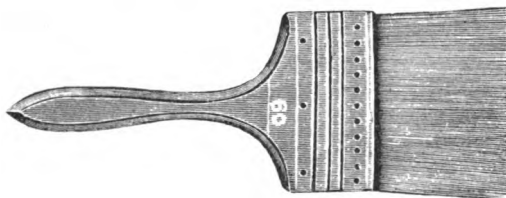
Width.....inches	1	1½	2	2½	3
Each.....	\$0.50	.80	1.00	1.25	1.75



No. 1058

1058 Brushes, Bristle. For buckboard cleaning, flat.

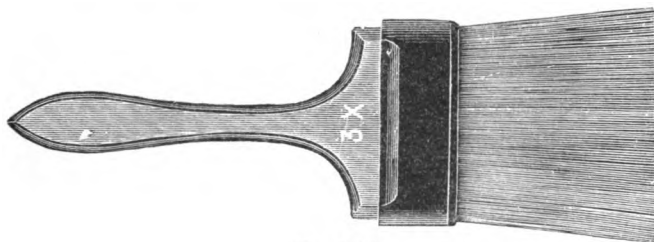
Width.....inches	3	3½	4	5
Each.....	\$0.60	.70	.80	1.00



No. 1060

1060 Brushes, Bristle. Tin bound. For buckboard cleaning. Best quality.

Width.....inches	3	3½	4	5
Each.....	\$0.80	1.00	1.20	1.50



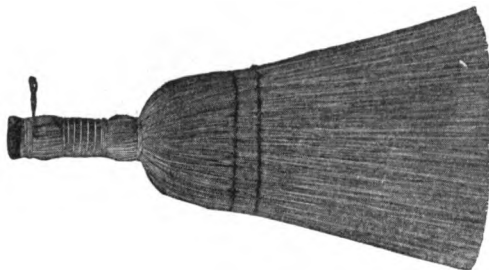
No. 1062

1062 Brushes, Bristle. For buckboard cleaning, flat, rubber set.

Width.....inches	3	3½	4	5
Each.....	\$1.00	1.25	1.50	2.00

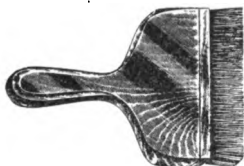
Brushes. For Donaldson's Slag Hammer, see Hammers, page 264, No. 2402.

BRUSHES



No. 1064

- 1064 Brooms, Corn, Whisk. Extra quality, light weight.....doz. \$2.50
 1066 Brooms, Whisk. Amalgam, extra heavy, for cleaning plates.....doz. 3.00



No. 1068

- 1068 Brush. For amalgam plates, stiff bristle, 4 inches wide, each 1.00



No. 1072

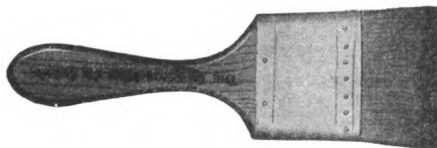
- 1070 Brushes, Spun Glass. For acids..... .25
 1072 Brushes, Camel Hair Pencils.

Size.....	Small	Medium	Large
Doz.....	\$0.15	.20	.30



No. 1074

- 1074 Brushes, Camel Hair. Extra large stock, $\frac{1}{2}$ inch diameter..... .20



No. 1078

- 1076 Brushes, Camel Hair. Stock, 1 inch, wooden handleeach .75
 1078 Brushes, Camel Hair. Flat, tin bound; for scale pans, etc.
- | Width.....inches | $\frac{1}{2}$ | 1 | $1\frac{1}{2}$ | 2 | $2\frac{1}{2}$ | 3 |
|------------------|---------------|-----|----------------|-----|----------------|-----|
| Each..... | \$0.15 | .20 | .30 | .40 | .50 | .70 |

BRUSHES



No. 1080

- 1080 Brushes, Bristle. For assay buttons. Bristles set in firmly each \$0.40



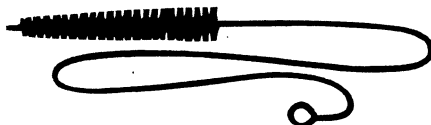
No. 1082

- 1082 Brushes, Bristle. For test tubes. With sponge ends. These are superior, inasmuch as the brass wire holding the sponge is twisted in a loop, protecting the test tube from breakage.

Size	For $\frac{5}{8}$ in.	For $\frac{3}{4}$ in.
Dozen	\$0.75	.85

- 1084 Brushes, Bristle. For test tubes. Bristle end, on tinned iron wire.
- | | |
|-------------|--------|
| Each | \$0.05 |
| Dozen | .40 |

- 1086 Brushes, Bristle. For long tubes, burettes, etc., 36 inches long.....each .15



No. 1088

- 1088 Brushes, Bristle. For narrow tubes.....each \$0.15

- 1090 Brushes, Bristle. For cylinders, large tubes, bottles, etc., with handle.
- | | | | | |
|--------------|--------|-----|-----|-----|
| Length | 10 | 12 | 15 | 20 |
| Each | \$0.10 | .15 | .20 | .25 |



No. 1092

- 1092 Brushes, Bristle. Wood handle, for beakers.....each \$0.20

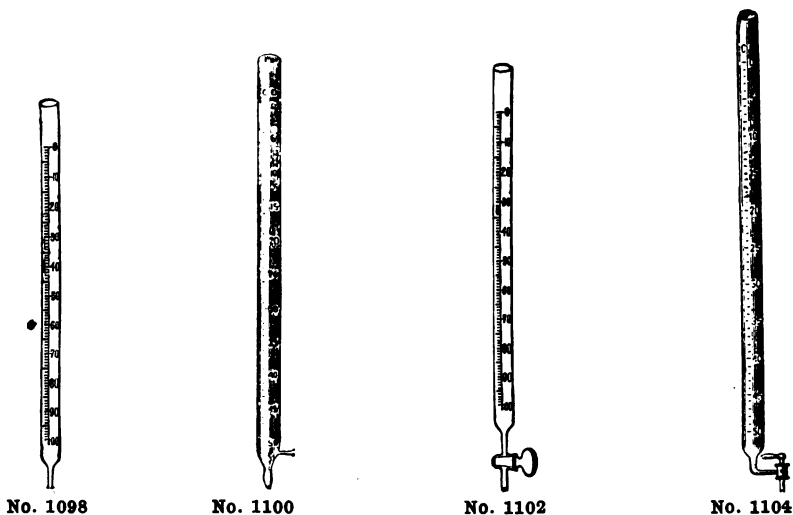
- 1094 Brushes, Bristle. $3\frac{1}{2}$ inches in diameter, paint stump bristle, extra large tumbler.....each .50



No. 1096

- 1096 Brushes, Bristle. Round, stiff, for brushing out platinum crucibles, etc. .each .10

BURETTES



1098 Burettes, Mohr's. Most accurately graduated, for pinch-cocks; with tip and rubber connection.

Capacity.....cc.	25	50	100	100
Graduated in.....cc.	1-10	1-10	1-5	1-10
Each.....	\$0.65	1.20	1.50	2.00

1100 Burettes, Mohr's. With side filling tube, for pinch-cocks, with tip and rubber connection.

Capacity.....cc.	25	50	100	100
Graduated in.....cc.	1-10	1-10	1-5	1-10
Each.....	\$0.75	1.25	1.75	2.20

1102 Burettes, Mohr's. With Geissler's glass stopcock.

Capacity.....cc.	25	50	100	100
Graduated in.....cc.	1-10	1-10	1-5	1-10
Each.....	\$1.35	1.85	2.35	2.50

1104 Burettes, Fresenius'. With glass stopcock.

Capacity.....cc.	25	50	100
Graduated in.....cc.	1-10	1-10	1-10
Each.....	\$1.35	1.80	2.50

1106 Burettes, Gawalowsky's. With glass stopcock and glass side tube with stopcock, for filling from reservoir.

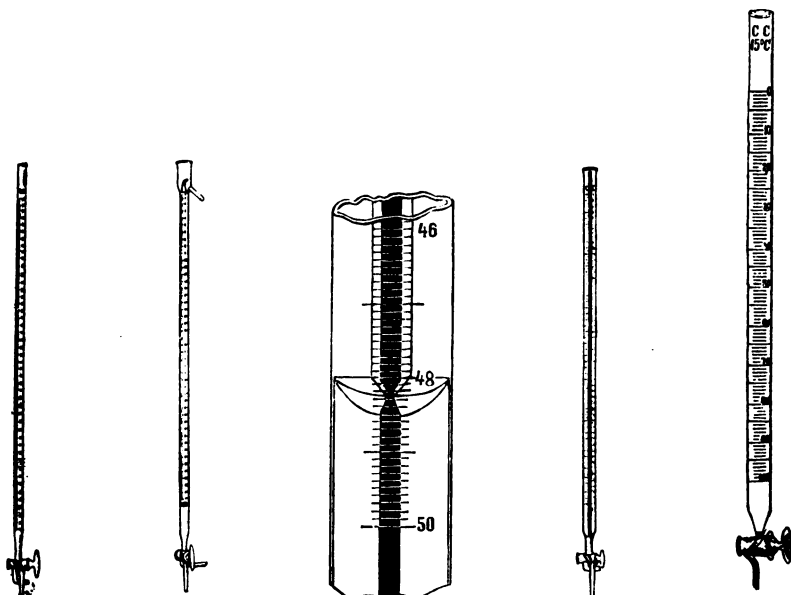
Capacity.....cc.	25	50	100
Graduated in.....cc.	1-10	1-10	1-10
Each.....	\$2.50	3.00	4.50

Bucking Boards. See Crushers, page 149, Nos. 1576-1578.

Bulbs, Rubber. See page 350, Nos. 3126-3128.

Bulbs, Potash. See page 337, Nos. 3012-3020.

BURETTES



No. 1108

No. 1110

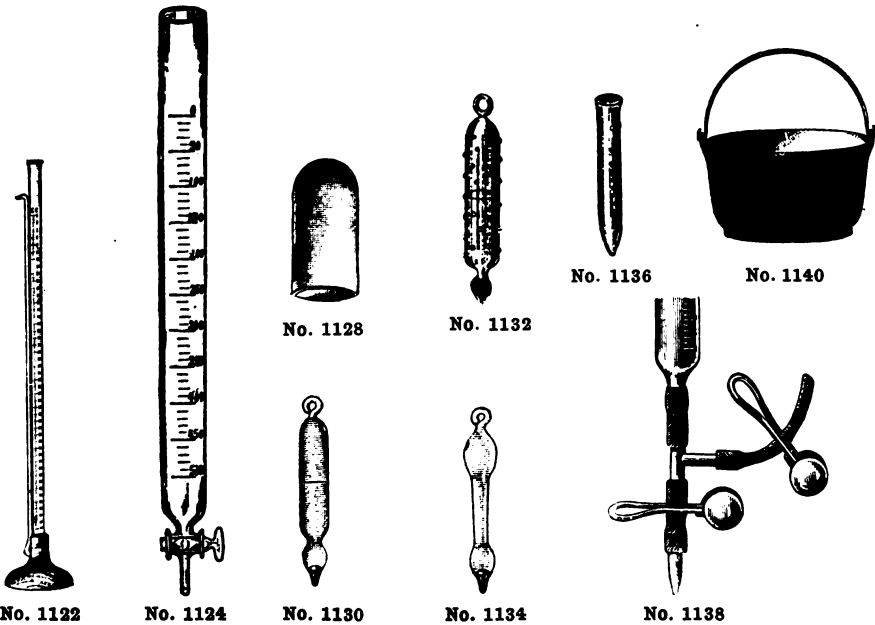
Nos. 1112-1116

No. 1118

No. 1120

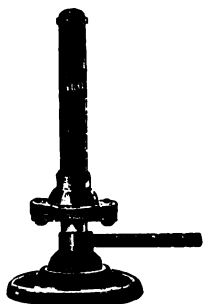
1108	Burettes. With 3-way glass stop-cock and tube for filling from reservoir.			
	Capacity.....cc.	25	50	100
	Graduate.....cc.	1-10	1-10	1-10
	Each.....	\$2.00	2.50	3.50
1110	Burettes, Automatic. With zero point and over-flow reservoir.			
	Capacity.....cc.	25	50	100
	Graduate.....cc.	1-10	1-10	1-10
	Each.....	\$3.00	3.50	4.50
1112	Burettes, Schellbach's. Same as above.....	\$3.50	4.00	4.50
1114	Burettes, Schellbach's. With dark enameled stripe on white enamel back-ground, giving a definite meniscus; with tip and rubber connection.			
	Capacity.....cc.	25	50	100
	Graduate.....cc.	1-10	1-10	1-10
	Each.....	\$1.20	1.50	2.50
1116	Burettes, Schellbach's. With glass stop-cock.			
	Capacity.....cc.	25	50	100
	Graduate.....cc.	1-10	1-10	1-10
	Each.....	\$2.00	2.50	3.50
1118	Burettes, Schellbach's. With three-way stop-cock.			
	Capacity.....cc.	25	50	100
	Graduate.....cc.	1-10	1-10	1-10
	Each.....	\$2.25	3.00	4.00
1120	Burettes. With absolutely tight stop-cock, bored at an angle of 45 degrees.			
	Capacity.....cc.	25	50	100
	Graduate.....cc.	1-10	1-10	1-10
	Each.....	\$1.50	2.00	3.00

BURETTES

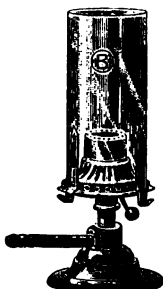


1122 Burettes, Gay Lussac's. On polished wood base.					
Capacity	cc.	25	50	100	
Graduate	cc.	1-10	1-10	1-5	
Each		\$1.00	1.50	2.00	
1124 Burettes, Dispensing. With glass stopcock. For liquids in large quantities.					
Capacity	cc.	250	500	1000	
Each		\$2.50	3.00	4.00	
1126 Burettes. Same as above, but without stopcock.					
Capacity	cc.	250	500	1000	
Each		\$1.50	2.00	3.00	
1128 Burette Caps. To protect contents from dust, assorted					
				per dozen	\$0.50
1130 Burette Float, Erdmann's					
				each	.25
1132 Burette Float, Volhard's. With points to prevent adhering to walls.					
Each .....					.50
1134 Burette Float, Beutell's					
				each	.35
1136 Burette Tips					
Per dozen .....					.40
1138 Burette Attachment. Three-way, connecting any burette with reservoir, for re-filling					
				each	.50
1140 Buckets, Amalgam or Quicksilver. Of iron, white enamel inside					
Capacity	qts.	2	3	4	6
					8
					12
Each		\$0.40	.50	.60	.70
					.80
					1.00

BURNERS



No. 1142



No. 1144

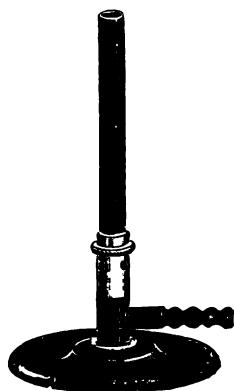


No. 1148

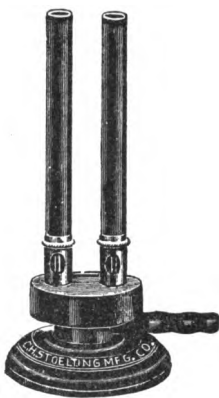


No. 1150

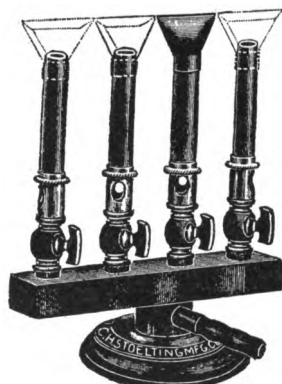
1142	Burner, Bunsen.	For acetylene gas; height, 6 inches, diameter of tube, $\frac{1}{8}$ inch	\$1.50
1144	Burner, Argand.	Low form, with glass chimney, 7 inches high. The flame is adjustable, can be turned very low	1.10
1146	Burner, Argand.	Same as above, but with iron chimney, 4 inches high; very useful for heating purposes	1.10
1148	Burner, Bunsen.	Small form, nickeled; 2 inches high, tube $\frac{1}{8}$ inch diameter .....	.50
1150	Burner, Bunsen.	Low shape, with air regulator .....	.50



No. 1152



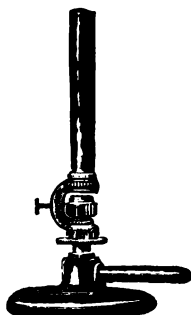
No. 1156



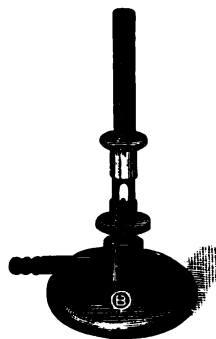
No. 1164

1152	Burner, Bunsen.	Usual size, with air regulator .....	.35
1154	Burner, Bunsen.	Large tube, $\frac{1}{2}$ inch diameter .....	.50
1156	Burner, Bunsen.	With 2 tubes, and air regulators	1.25
1158	Burner, Bunsen.	With 3 tubes, and air regulators	1.50
1160	Burner, Bunsen.	With 4 tubes, and air regulators	2.00
1162	Burner, Bunsen.	With 4 tubes in one row	4.50
1164	Burner.	Same as No. 1162 with stopcocks	6.00

BURNERS



No. 1166



No. 1168

1166 Burner, Bunsen. Self-adjusting Bunsen Burner, for burning gases of various qualities.

The special features of this burner are the following:

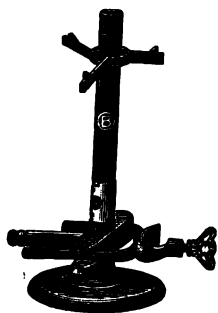
By turning the knurled part, you can increase or lower the flame, the flow of gas and air being regulated automatically, and therefore the burner will always retain a blue flame.

The supply of air is regulated by inserting the screw into the next slot, either to the right or to the left. Care must be taken that the screw is not inserted into the slot too tightly, as this will interfere with the turning of the burner.

If a yellow flame should be desired, separate the set-screw from burner-tip, allowing the gas and air to be regulated separately. This is the best self-adjusting Bunsen burner made, and we can recommend it to give entire satisfaction. Height 6 inches, diameter of tube, $\frac{1}{2}$ inch.

Each \$1.50

1168 Burner, Bunsen. For gasoline gas75



No. 1170



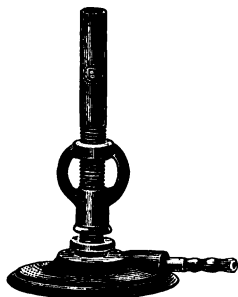
No. 1174

1170 Burner, Bunsen. With fork to attach to ring stand, and star for chimney.
Each 1.50

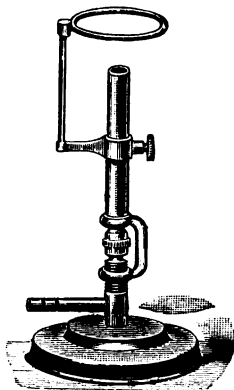
1172 Burner, Bunsen. With small constant flame, for relighting with stopcock.
Each 2.00

1174 Burner, Chaddock's. Of porcelain, incorrodible; for use in hoods where metal on account of the smoky flame, soon corrodes. Complete with support for dishes, chimney and 3 asbestos pads 2.00

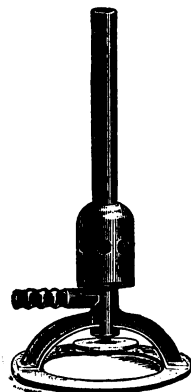
BURNERS



No. 1176

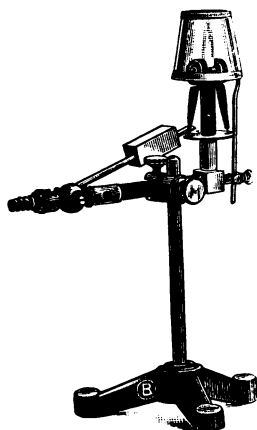


Nos. 1178-1180

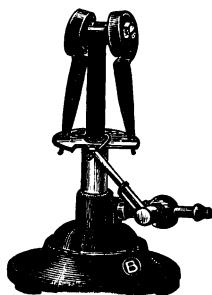


No. 1182

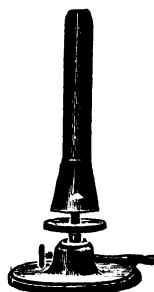
- 1176 Burners, Detroit Style. For gasoline gas \$1.00
- 1178 Burners Bunsen, Adjustable. Its adjustability renders it a favorite burner for those using gasoline gas, or the mixture of gasoline vapor and air made by gas machines 1.00
- 1180 Burners. Same as No. 1178, but with adjustable support 2.00
- 1182 Burners, Tirril's. For gasoline gas; very highly recommended 1.20



No. 1184



No. 1186



No. 1188

- 1184 Burners, Koch's Safety. On adjustable stand 10.00
- 1186 Burners. Same as above, simple form, 6 in. high 6.00
- 1188 Burners, Teclu's. Giving a large and powerful flame 1.75
- 1190 Burners, Illuminating. Table light, 12 inches high 1.00
- Burner Fork. See Clamps, page 125, No. 1400.

BURNERS AND BLAST LAMPS



No. 1192



No. 1194

1192	Burners. Ring form, for heating funnels, etc., may be attached to a support.				
	Diameter.....inches	3	4	5	6
	Each.....	\$1.25	1.50	1.75	2.00
1194	Burners. Same as above, with stopcock.....	\$1.50	2.00	2.50	3.00

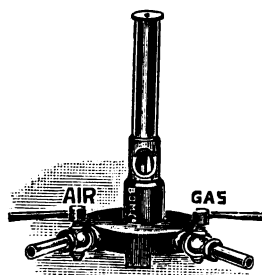


No. 1196

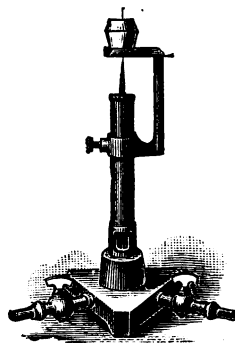


No. 1198

1196	Blast Lamps, Bunsen. For gas. Improved form, complete with set of 3 tips	\$3.50
1198	Blast Lamp or Compound Blow Pipe. Improved form—made on the principle of a stopcock, having a ground key, consequently there is no leakage of gas, as on others. From a delicate pointed jet to a large powerful flame can be obtained by a movement of the lever which adjusts both air and gas automatically. When the lever is turned to the right a small flame is produced; to the left a large flame, and when in the center the gas is turned off, allowing only the pilot light to burn. The pilot light may be kept burning continually if desired, it being unnecessary to light the burner every time it is to be used.	
	Each.....	7.50



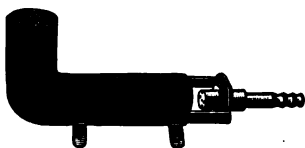
No. 1200



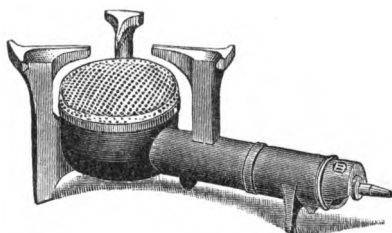
No. 1202

1200	Blast Lamps, Fletcher's. With upright blast	\$3.50
	Accessories for above.	
1202	Blow Pipe Furnaces. With bottom or side hole, and 1 crucible	.25
1204	Clay Crucibles, 3/4-inch diameter, per dozen	.20
1206	Clay Capsules, per dozen	.20
1208	Furnace Supports	.60

BURNERS

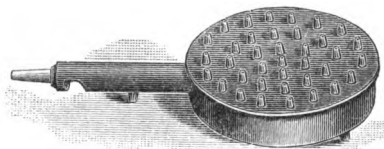


No. 1210



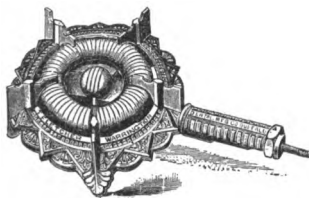
Nos. 1212-1216

1210	Burners. Low shape, extra large, with gauze top, height, 5 inches, diameter, $2\frac{1}{4}$ inches, extreme length, 14 inches.....	\$2.00
1212	Burners. Solid flame, small, 3 inches in diameter.....	1.00
1214	Burners. Solid flame, large, 4 inches in diameter.....	2.00
1216	Burners, Fletcher's. Solid flame. For gasoline gas, with wheel valve.	
	Size.....	Small Large
	Each	\$1.75 3.00
1218	Extra Gauze Tops. For above; small, \$0.30 each, large, \$0.35 each.	



No. 1220

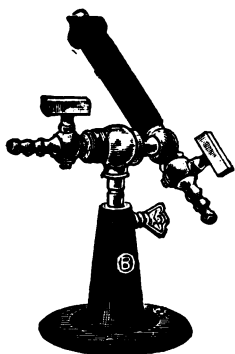
1220	Burners. Cast iron evaporating.	
	Size, 4 inches	\$1.00
	Size, 5 inches.....	1.25
	Size, $6\frac{1}{2}$ inches	2.00



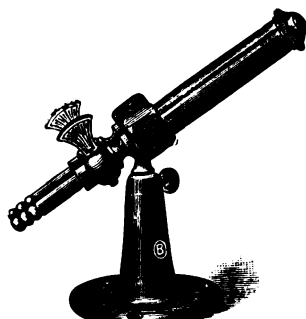
No. 1222

1222	Burners, Fletcher's Radial.	
	Ring diam.....in.	$3\frac{3}{4}$ 5
	Price.....each	\$1.50 2.00 net
1224	Burners, Fletcher's Radial. For gasoline gas, wheel valve regulator.	
	Ring diam.....in.	$3\frac{3}{4}$ 5
	Price.....each	\$2.25 3.00 net

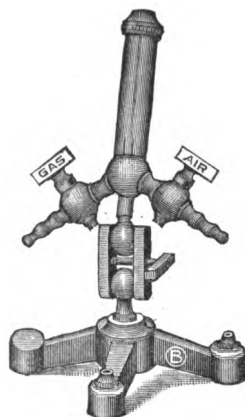
BLAST LAMPS



No. 1226

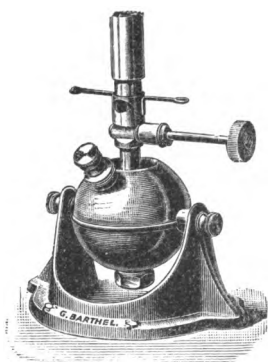


No. 1228

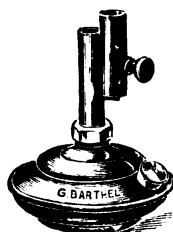


No. 1230

- | | | |
|------|---|--------|
| 1226 | Blast Lamps, Bunsen. For gas | \$3.50 |
| 1228 | Blast Lamps, Bunsen. For gas; new pattern, blast and gas supply pipe in one direction | 3.50 |
| 1230 | Blast Lamps, Wisneg or French form. Mounted on ball joint | 4.00 |



No. 1232



No. 1234



No. 1236

- | | | |
|------|--|--------|
| 1232 | Blast Lamps, Barthel's. For gasoline, on stand, revolves so as to give both vertical and horizontal flame, without danger of explosion | \$9.00 |
| 1234 | Burners, Barthel's, Benzine. Working without wick; equal to 2 Bunsen gas burners..... | 7.00 |
| 1236 | Burners, Barthel's, Benzine. Boiler, with tube for Bunsen flame | 6.00 |

BURNERS

ATTACHMENTS FOR BUNSEN BURNERS WITH $\frac{1}{8}$ -INCH TUBE



No. 1250



No. 1252



No. 1254



No. 1256



No. 1258



No. 1260



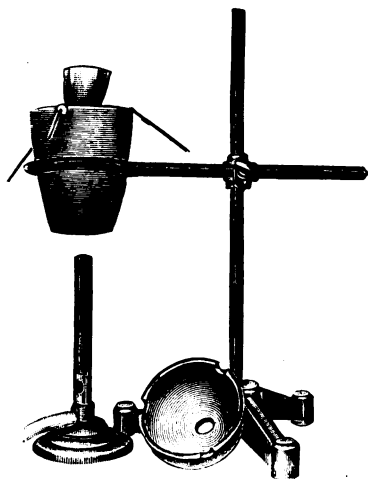
No. 1262



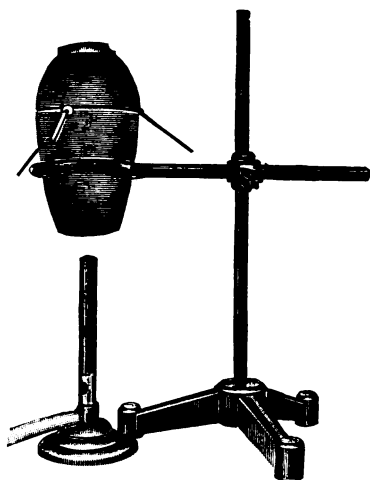
No. 1264

1250	Burner Tube. For blow piping, with yellow flame, fitting inside burner.....	\$0.15
1252	Burner Tip. With rest for blow pipe.....	.15
1254	Burner Crown. Giving a round flame, for heating small dishes.....	.35
1256	Burner Gauze Top. Giving a large round flame .....	.25
1258	Burner Wing Top. For bending glass tubing, etc.....	.15
1260	Burner, Star.....	.25
1262	Burner Chimneys. Of Russia iron.....	.20
1264	Burner Tripod. Small.....	.20

HIGH TEMPERATURE BURNERS WITHOUT BLASTS



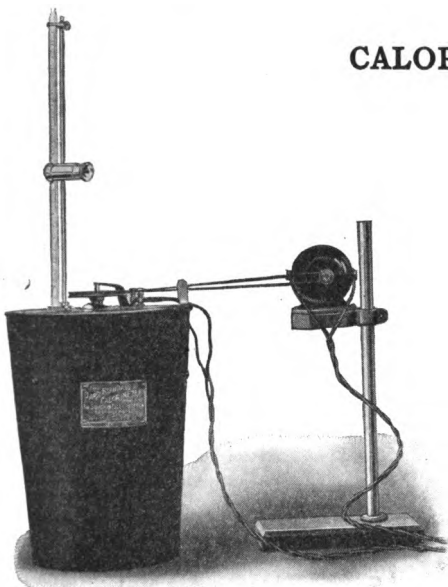
No. 1266



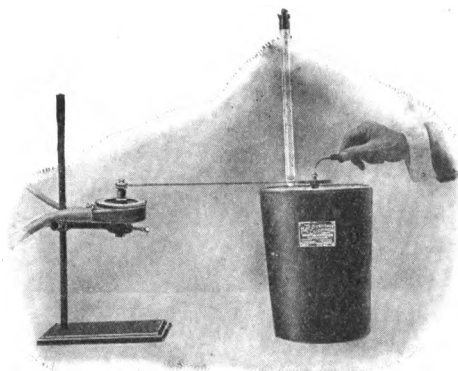
No. 1266

- 1266 Burner. High temperature, without blast. Designed for high temperature fusions. Very efficient and in many cases does away with the blast lamp in the laboratory. Prices, complete without platinum crucible ... 2.50

CALORIMETERS



No. 1268



No. 1268

1268 Calorimeter. Parr's Standard Calorimeter. Devised by Prof. S. W. Parr, of the University of Illinois.

The instrument, as priced, includes the Calorimeter proper, a guaranteed accurate thermometer graduated to 1-20° F.; a 2000 cc. graduated flask measuring cup, 5-inch brass sieve, 100 mesh; pincers, reading lenses, camel's hair brush, igniting wire and chemicals for fifty determinations.

Price, complete, for Electric Ignition, including Battery \$75.00

Price, complete, for Wire Ignition 70.00

Price, Water Motor, for Stirring 5.00

Electric Motor, operated by two dry cells, put up in wooden case and made especially for use with Parr's Calorimeter net 5.00

The following items are not included in the regular outfit, as they are usually to be found in Chemical Laboratories:

Electric Stirring Motor, operated by two dry cells, put up in a wooden case, made especially for use with Parr's Calorimeter. Price.....net \$ 5.00

Electric Motor and Support, for 110 or 220 volts 12.50

Water Motor and Support..... 5.00

New Reading Lens with Support 3.00

New Reading Lens without Support 2.00

Hot Air Oven..... 5.00

Thermometer for Oven 1.40

Mortar and Pestle..... .75

Watch Glasses with Clip50

EXTRAS

Bombs for Wire Ignition 22.50

Bombs for Electric Ignition 25.00

Thermometer 65- 90° F., with Certificate 10.00

Thermometer 65-105° F., with Certificate 15.00

Ignition Wire, Electric, per roll50

Ignition Wires (hot wires), per dozen..... .25

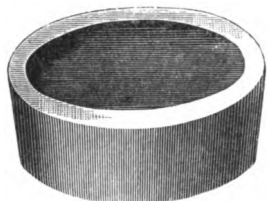
Chemical—per ¼-lb. can..... .65

Chemical—per ½-lb. can..... 1.25

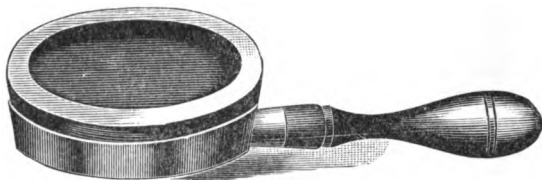
Chemical—per 1-lb. can..... 2.00

Accelerator—per bottle50

CARBON SOLDERING BLOCKS



No. 1270



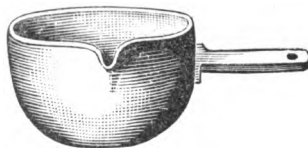
No. 1272

- 1270 Carbon Soldering Blocks. For supporting work under the blow pipe. Cleanly and perfect non-conductors. They are circular, depressed on each face, and 4 inches in diameter. \$0.25
- 1272 Carbon Soldering Block Holders. A very convenient device for holding carbon soldering blocks.25
- Caps, Miners'. See under Acetylene Lamps, page 284, No. 2652.
Carboy Rocker or Inclinator. See page 1, No. 206.

CASSEROLES



No. 1274

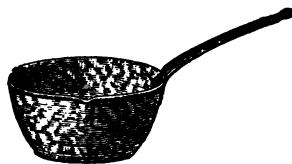


No. 1276

- 1274 Casseroles, Royal Berlin Porcelain. With porcelain handle.
- | | | | | | | | |
|---------------|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| No. | 1 | 2 | 3 | 3a | 4 | 5 | 6 |
| Dia. in. | 2 | 2 $\frac{3}{4}$ | 3 $\frac{1}{4}$ | 3 $\frac{3}{4}$ | 4 $\frac{1}{4}$ | 5 $\frac{1}{4}$ | 6 $\frac{1}{2}$ |
| Capacity, oz | 1 | 3 | 5 | 8 | 13 | 24 | 44 |
| Each. | \$0.35 | .40 | .50 | .70 | .85 | 1.40 | 1.75 |
- 1276 Casseroles, German Porcelain. With porcelain handle.
- | | | | | | | | |
|--------------|--------|-----|-----|-----|-----|-----|------|
| Capacity, oz | 1 | 2 | 4 | 8 | 12 | 16 | 32 |
| Each. | \$0.20 | .25 | .30 | .35 | .55 | .80 | 1.00 |



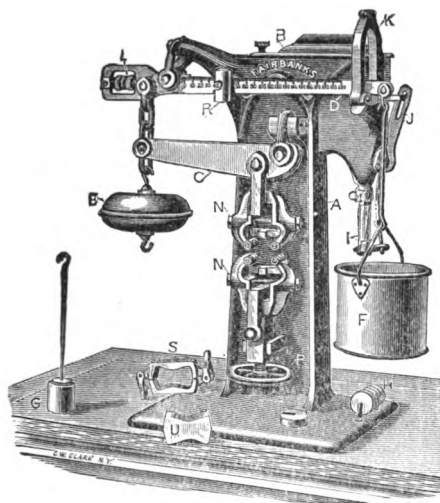
No. 1278



No. 1280

- 1278 Casseroles, German Porcelain. With cover and wooden handle.
- | | | | | | | |
|---------------|--------|-----|-----------------|-----|------|-----------------|
| Dia. in. | 3 | 4 | 4 $\frac{1}{2}$ | 5 | 6 | 6 $\frac{1}{2}$ |
| Capacity, oz | 4 | 8 | 12 | 16 | 24 | 32 |
| Each. | \$0.50 | .60 | .70 | .90 | 1.25 | 1.60 |
- 1280 Casseroles, Agateware.
- | | | | | |
|---------------|-----------------|--------|-------|--------------------|
| Dia. in. | 4 $\frac{1}{2}$ | 5 | 6 | 7 |
| Capacity | 1 pt. | 24 oz. | 1 qt. | $\frac{1}{2}$ gal. |
| Each. | \$0.25 | .30 | .35 | .45 |

CEMENT TESTING APPARATUS



No. 1282

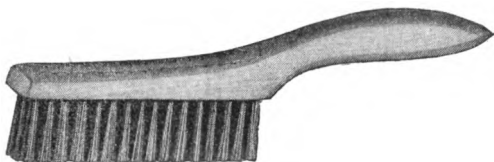
1282 Cement Testing Machine, Automatic, Fairbanks. This machine is recognized as the standard. Capacity, 1,000 pounds; size 24x24 inches. Outfit includes one Standard Briquette Mould.

Price..... each \$110.00

1284 Testing Machine, Fairbank's Automatic Improved, with tension attachment.

This machine is the same as the above but is equipped with auxiliary base containing worm and worm gear, connected to an axis which is threaded and passes up through the base and hand-wheel with a block, and the latter connected to the lower clamp.

Price..... each \$165.00



No. 1286

1286 Cement-Briquette Mould Brushes, with Brass Wire Brush and Wooden Handle. Brush portion, 5 inches long.

Price..... each \$0.50



No. 1288



No. 1290

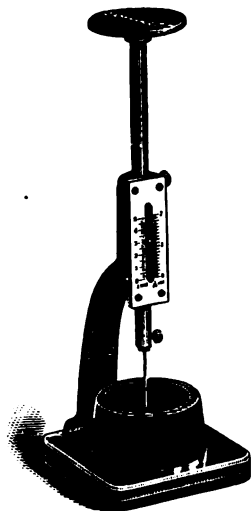
1288 Cement-Galvanized Iron Pans, with Handles. Size, 24 x 24 x 3 inches

Price..... each \$2.00

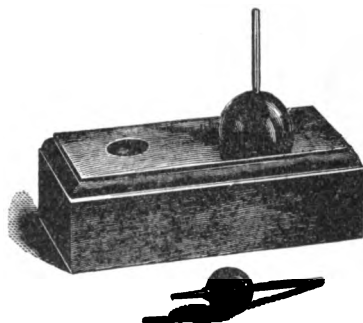
1290 Cement-Glass Plates, of Heavy Glass with Smooth Edges, Size, 24 x 24 inches.

Price..... each 8.00

CEMENT TESTING APPARATUS



No. 1292



No. 1294

- 1292 Cement-Vicats Indenting Apparatus, improved. This apparatus does not require (as do other makes), an extra compensating weight to give a downward pressure of 300 grams when the 1 millimeter needle is used (as both needles are made to weigh the same), thus obviating an element of error by overlooking the use of the compensating weight with the small needle.

Price.....each, net \$25.00

Extra Hard Rubber Ring Moulds. Priceeach, net 3.00

Extra Needles, 1 millimeter or 1 centimeter. Price.....each, net 1.50

- 1294 Cement-Gilmore Needle. These needles are used for determining both the initial and the final set of cement.

They consist of a steel needle $\frac{1}{8}$ of an inch in diameter, loaded with a weight of $\frac{1}{4}$ pound and of a needle $\frac{1}{16}$ of an inch in diameter, loaded with a weight of one pound.

Priceeach, net \$5.00

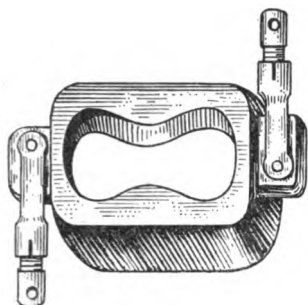


No. 1296

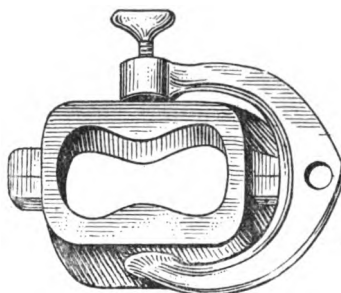
- 1296 Cement Trowel.

Large	1.00
Small .....	.75

CEMENT TESTING APPARATUS

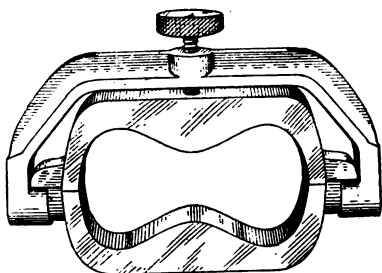


No. 1298



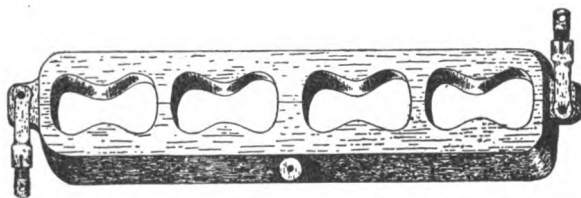
No. 1300

- | | | |
|------|--|--------|
| 1298 | Standard Cement-Briquette Mould, with end clamp according to the specifications of the American Society for testing materials, price.....each, net | \$3.00 |
| 1300 | Standard Cement Mould, as above, but with C Clamp | 3.00 |
| 1302 | Extra C Clamps for same..... | .30 |



No. 1304

- | | | |
|------|---|--------|
| 1304 | Improved Standard Cement-Briquette Mould, with means for separating sections automatically without rapping, according to the specifications of the American Society for testing materials, price..... each, net | \$3.00 |
|------|---|--------|



No. 1306

- | | | |
|------|-----------------------------------|------------|
| 1306 | Standard Cement-Briquette Moulds. | |
| | Gang of 2 | net \$6.00 |
| | Gang of 3 | net 9.00 |
| | Gang of 4 | net 12.00 |
| | Gang of 5 | net 15.00 |
| | Gang of 6 | net 18.00 |

CEMENT TESTING APPARATUS



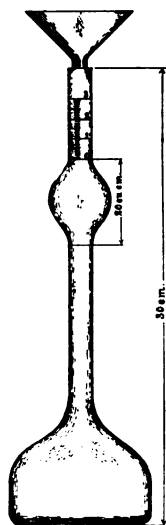
No. 1308



No. 1310



No. 1312



No. 1314

- 1308 Specific Gravity Apparatus—Jackson's. Consisting of the Burette, so graduated as to give direct readings in specific gravity, and the heavy Erlenmeyer Flask with hollow glass stopper.

Price.....each, net \$6.00

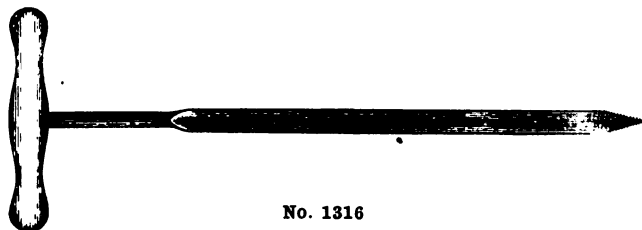
- 1310 Extra Flasks.....net 2.00

- 1312 Volumenometer—Shumann's—with Tube Graduated to 50 c.c. in 1-10 c.c.

Price.....each, net 2.75

- 1314 Specific Gravity Apparatus—La Chatelier's—for cement.

Price.....each, net 2.25



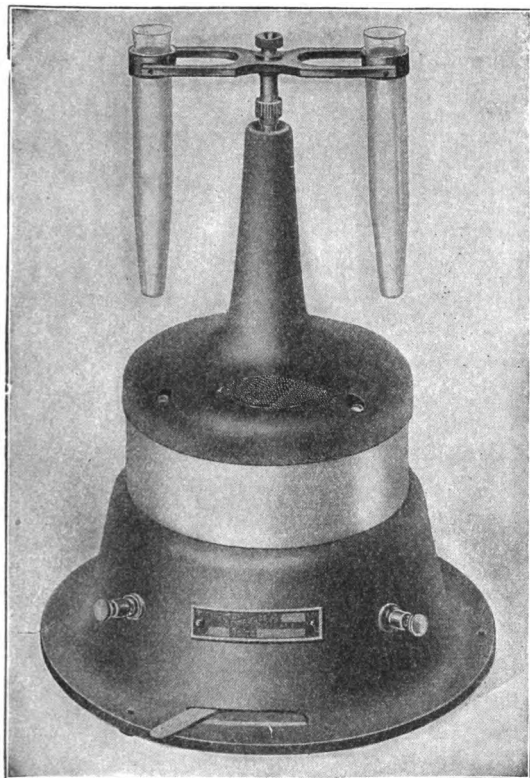
No. 1316

- 1316 Cement Sampler, for obtaining samples from the center of a barrel, the point being an auger, enabling one to bore through the staves.

Price.....each, net \$7.50

CENTRIFUGES

FOR THE EXAMINATION OF URINE, BLOOD, AND MILK



No. 1318

For hospitals, colleges and laboratories where the electric current is to be had, the Purdy Electric Centrifuge is the greatest possible convenience. By means of the electric current a uniform speed can be maintained for any length of time desired, and delicate tests can be made which cannot be easily gotten from a handpower machine where the speed varies.

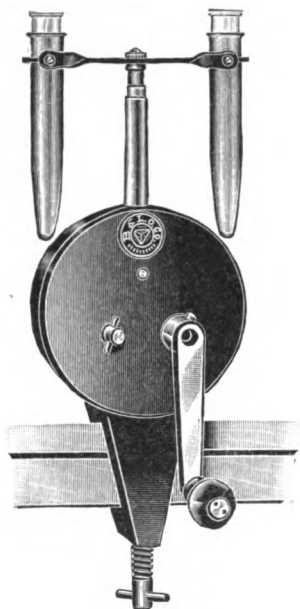
These new centrifuges are provided with a lever for regulating the speed.

We furnish this centrifuge to work on either the direct or alternating current. In ordering please state the current it is to be used upon, giving also voltage, cycles, etc. When centrifuge is to be used on 220-volt current, add \$10.00 to prices given below.

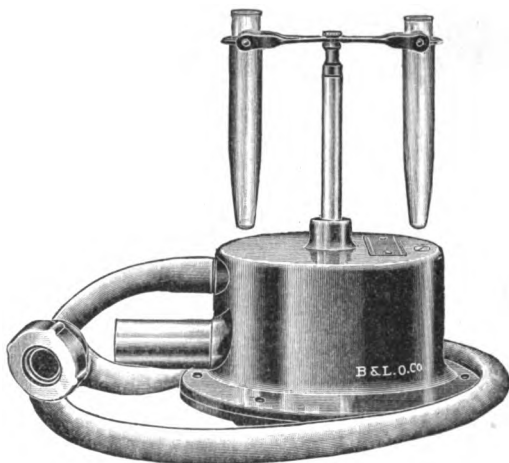
1318	Electric Centrifuge for examination of urine, with double urine arm carrying two tubes, two plain glass sediment tubes and two graduated percentage tubes, net	\$32.00
1320	Electric Centrifuge, same as No. 1318 with addition of Hematokrit arm for examination of blood and sputum, net	37.00
1322	Electric Centrifuge, same as No. 1318 with addition of Precipitating arm for manipulation of micro-organisms, net	37.00
1324	Electric Centrifuge, same as No. 1318 with both Hematokrit and Precipitating arm, net	42.00
1326	Special arm for four tubes for centrifuge with glassware, where ordered with the centrifuge instead of two-arm tube, net	4.50
1328	New Precipitating Arm, for the concentration of bacteria in urine, with two tubes, net	5.00
1330	Urine Percentage Tubes, $5\frac{1}{8}$ inches, graduated 15 cc., each .....	.75
1332	Plain Sediment Tubes, without graduation, $5\frac{1}{8}$ inches, each .....	.20
1334	Aluminum Shields, 5 inches, each .....	.40
1336	Speed Gauge	2.50

Centrifuge for Milk Testing. See Milk Testing Apparatus, page 306, No. 2730.

CENTRIFUGES

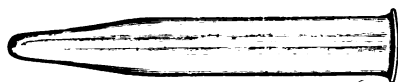


No. 1338

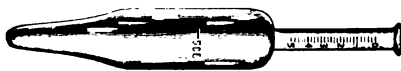


No. 1340

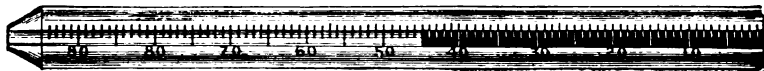
- 1338 Centrifuge, Hand. For urine, sputum, milk and water analysis. Gives 3000 revolutions per minute. Complete with one graduated and one ungraduated sedimentation tube..... net \$10.00
- 1340 Centrifuge, Water Motor. For the rapid and convenient sedimentation of solids in urine and other fluids. Perfect mechanical construction. Absolutely noiseless, contact parts cannot be rusted. Needs no attention. May be left running constantly; any one can operate it; the simplest and most efficient yet operated. Each.....net 10.00



No. 1342



No. 1344



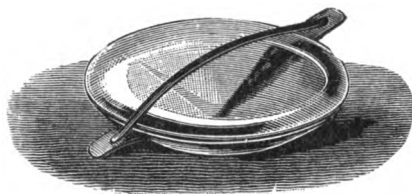
No. 1346

- | | |
|---|-----|
| 1342 Sedimentation Tubes. Plain | .15 |
| 1344 Sedimentation Tubes. Graduated | .35 |
| 1346 Milk Tubes. Graduated | .50 |

CLAMPS



Nos. 1352-1356



No. 1358



No. 1360

1348 Chamois Skins. Best quality, entirely waterproof, according to size.

Each.....\$0.25 to \$1.25

In ordering, state size and for what use.

1350 Charcoal. Of hard wood, cut in oblong pieces, $4\frac{1}{2} \times 1$ inches, for blow pipe use..... per dozen .50

1352 Clamps, Chaddock's. For test tubes, of japanned spring wire, rubber covered jaws.....each .25

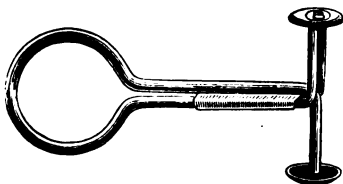
1354 Clamps, Chaddock's. For beakers, of japanned spring wire, rubber covered jaws.....each .25

1356 Clamps, Chaddock's. For evaporating dishes, of japanned spring wire, Each..... .25

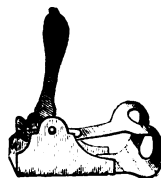
1358 Clamps. For watch glasses, sheet brass, nickel-plated.

Size.....		Small	Large
Each.....		\$0.20	.25

1360 Clamps. For watch glasses, brass wire..... each \$0.25



No. 1362



No. 1364

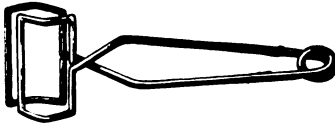
1362 Clamps, Mohr's. Spring compressor, nickel-plated.

Size.....inches	$2\frac{1}{2}$	3	$3\frac{1}{2}$
Each.....	\$0.10	.12	.15

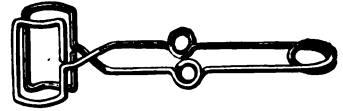
1364 Clamps, or Cut-offs. Nickel-plated, large size, with $\frac{1}{8}$ -inch opening.

Each..... \$0.10

CLAMPS



No. 1366



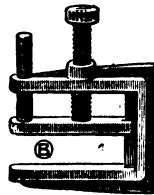
No. 1368

- 1366 Clamps, or Test Tube Holders. (Stoddard's), of spring wire, nickel-plated, 4½ inches long \$0.10
- 1368 Clamps, or Test Tube Holders. Of spring wire, with improved finger rests, 5 inches long..... .15



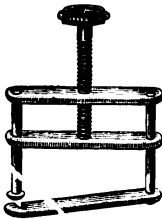
No. 1370

- 1370 Clamps, or Test Tube Holders. Of wood, improved construction, with wire spring..... .10



No. 1374

- 1372 Clamps, or Forceps. For cover glass (Stewart's), nickel-plated, of spring wire, 4½ inches long10
- 1374 Clamps, or Screw Compressors. Brass, nickel-plated, new construction, can be placed upon the tube without disconnecting the apparatus.
- | | | |
|------------|---|------------------------------------|
| Size..... | inches $\frac{1}{2} \times \frac{3}{4}$ | $\frac{3}{4} \times 1 \frac{1}{4}$ |
| Each | \$0.20 | .30 |



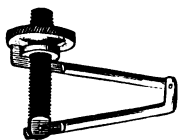
No. 1376



No. 1378

- 1376 Clamps, Hoffman's Screw Compressor. Improved form, can be used on tubing without disconnecting apparatus.
- | | | |
|------------|---|------------------------|
| Size..... | inches $\frac{1}{2} \times \frac{3}{4}$ | $\frac{1}{2} \times 1$ |
| Each | \$0.20 | .25 |
- 1378 Clamps, Hoffman's Screw Compressor. Nickel-plated.
- | | | |
|------------|---|------------------------|
| Size..... | inches $\frac{1}{2} \times \frac{3}{4}$ | $\frac{1}{2} \times 1$ |
| Each | \$0.20 | .25 |

CLAMPS

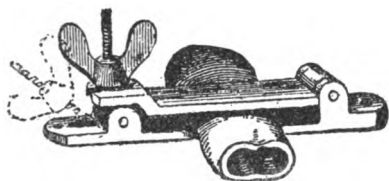


No. 1380

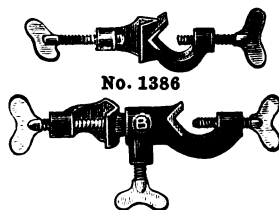


No. 1382

- | | | | |
|------|---|---------------|---------------|
| 1380 | Clamps. Lever spring compression, nickel-plated. Size inches. | $\frac{1}{2}$ | $\frac{3}{8}$ |
| | Each..... | \$0.30 | .35 |
| 1382 | Clamps. According to Bunsen, two bars with screws at each end,
of brass, nickel-plated, extra heavy. Size, $\frac{3}{4} \times 1\frac{1}{2}$ inch..... | | \$0.30 |



No. 1384

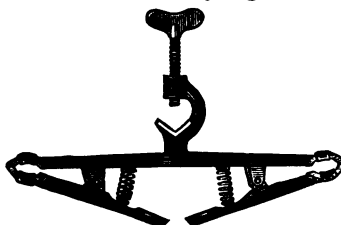


No. 1388

- | | | |
|------|--|-----|
| 1384 | Clamps, Bunsen's. For heavy rubber tubing, can be screwed on table;
to hold tubing up to 2 inches | .75 |
| 1386 | Clamps. Holder, for attaching clamps, extension rings, ring burners, etc.,
to supports. Small, \$.20; large | .25 |
| 1388 | Clamps. Holder, universal, of two parts, swiveled; can be set to any angle. Each | .50 |

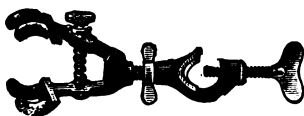


No. 1390

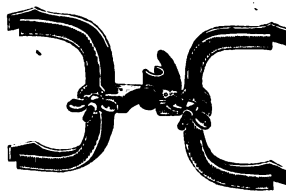


No. 1392

- | | | |
|------|--|-----|
| 1390 | Clamps. For burettes, jaws open by pressing the lever end, with spring closing | .50 |
| 1392 | Clamps. For two burettes, with spring closing | .85 |



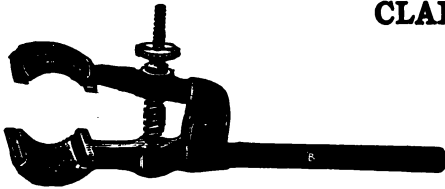
No. 1394



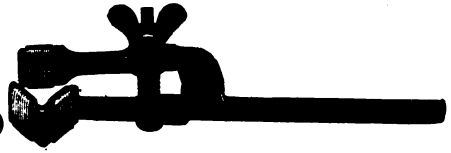
No. 1396

- | | | |
|------|---|------|
| 1394 | Clamps. For burettes and tubes, with set screw. The jaws may be set
at any angle..... | .40 |
| 1396 | Clamps. (Hoffman's), for two burettes | .75 |
| 1398 | Clamps. Double, of brass, for two burettes, most perfect made. It does
not cover the graduations | 2.50 |
| 1400 | Burner Fork. For holding burners on support stands. | .25 |

CLAMPS



Nos. 1402-1404

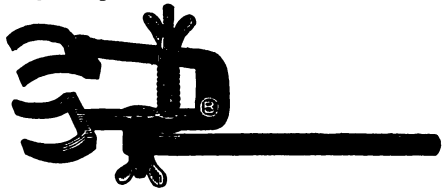


Nos. 1406-1408

- 1402 Clamps, Bunsen's. For burettes, small size, including clamp holder No. 1386.....each \$0.70
- 1404 Clamps, Bunsen's. Large size, including clamp holder No. 1386.....each .75
- 1406 Clamps, Burette. For small tubes and condensers, including clamp holder No. 1386.....each .70
- 1408 Clamps, Burette. Large size, including clamp holder No. 1386.....each .75

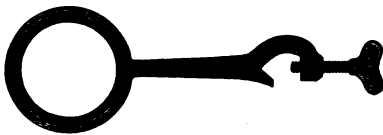


No. 1410



Nos. 1412-1414

- 1410 Clamps, Hoffman's.....each .60
- 1412 Clamps, Universal. The jaws adjust themselves to irregular shaped apparatus.....each .85
- 1414 Clamps, Universal. Large size.....each 1.00

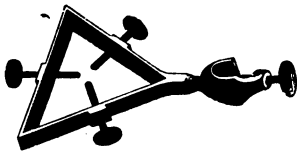


No. 1416



No. 1418

- 1416 Ring. With brass screw to attach to supports.
- | Diameter.....in. | 2 | 3 | 4 | 5 | 6 |
|------------------|--------|-----|-----|-----|-----|
| Each..... | \$0.15 | .20 | .25 | .30 | .35 |
- 1418 Rings, Extension. To attach with clamp holder No. 1386.
- | Diameter.....in. | 2 | 3 | 4 | 5 | 6 |
|------------------|--------|-----|-----|-----|-----|
| Each..... | \$0.25 | .30 | .35 | .40 | .45 |



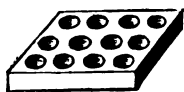
No. 1420



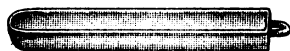
No. 1422

- 1420 Clamps, Brass. Triangle with adjustable screws, to support different sizes of crucibles.....each \$1.20
- 1422 Clamps, Iron. For fastening apparatus to table.
- | Size opening.....in. | 2 | 3 | 4 | 5 | 6 |
|----------------------|--------|-----|-----|-----|-----|
| Each..... | \$0.20 | .25 | .35 | .50 | .60 |
- Clamps. Holding Platinum Wire Triangle. See Platinum, page 336, No. 2990.
- Clamps. See also Supports, pages 372-377.

CLAY TUBES, COLOR TEST PLATES, COMBUSTION MATERIAL



No. 1426



No. 1430

1424 Clay Tubes. Of fire clay; length, 24 inches. Bore, $\frac{1}{8}$ or $\frac{1}{4}$ inch each \$0.60
NOTE—We can furnish estimates on any other size of clay tubes.

1426 Color Test Plates. Porcelain, with 12 cavities; size, $3\frac{1}{4} \times 4\frac{1}{4}$ in each .50
With 12 cavities; size, $5 \times 6\frac{1}{2}$ inches..... each .60
With 30 cavities; size, $5\frac{1}{2} \times 7$ inches..... each 1.50
With 24 cavities; size, $4\frac{1}{2} \times 7$ inches..... each 1.25

1428 Color Test Plates. Porcelain, without cavities, size $5\frac{1}{2} \times 7$ inches each 1.20

1430 Combustion Boats. Royal Berlin porcelain.

Size.....	mm.	55x12	75x12	100x12
Each.....		\$0.20	.25	.30



No. 1432

1432 Combustion Spoons. Size of cup inches $\frac{1}{2}$ 1
Brass each \$0.20 .25
Iron each \$0.15 .20



No. 1434

1434 Combustion Tubes. Infusible glass, with drawn out point. Bore, 13 mm.

Any other diameter or length made to order.

Length.....	inches	14	16	18	20	24
Each.....		\$0.20	.25	.30	.35	.40



No. 1436

1436 Combustion Tubes. German porcelain. Bore, $\frac{5}{8}$ inch diameter.

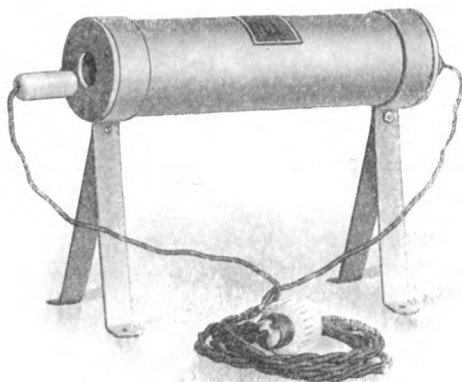
Length.....	inches	18	20	22	24
Each.....		\$1.00	1.20	1.35	1.75

1438 Combustion Tubes. Royal Berlin porcelain. Glazed inside and outside, 24 inches long.

Bore.....	inches	$\frac{5}{8}$	$\frac{3}{4}$	$1\frac{1}{8}$	$1\frac{1}{2}$	$1\frac{3}{4}$
Each.....		\$4.00	5.00	6.00	7.00	8.00

Combustion Tubes, Silica. See under Silica, page 361, No. 3254.

COMBUSTION FURNACES



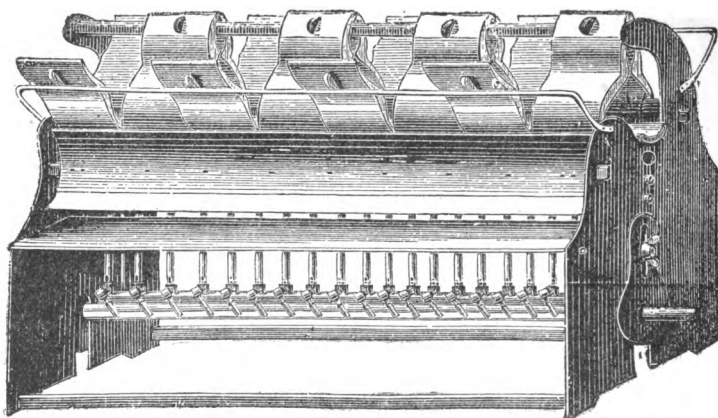
No. 1440

- 1440 Hoskin's Electric Combustion Furnace. For rapid determination of carbon contents of steels by the direct method, a complete combustion in 25 minutes. The fact that these furnaces are in use in the largest and busiest steel laboratories should convince you that they are proving entirely satisfactory.

The tube is 1 inch inside diameter, and 12 inches long; 10 inches of this length is uniformly heated to a constant temperature of 1000°C.

Operates well on direct or alternating circuits, and is made for 110 or 220 volts; other voltages to order. Requires 6 amperes at 110 volts, and 3 amperes at 220 volts.

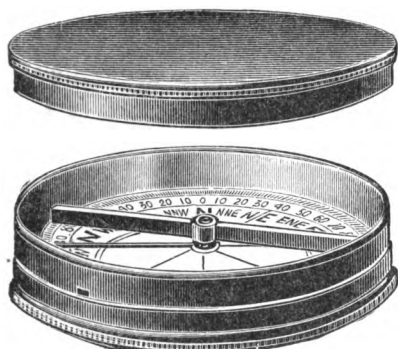
Price \$40.00
Rewinding 8.00



No. 1444

- 1442 Combustion Furnace, Glaser's. Modified by Anschuetz & Kekule; with 21 burners and mica plates for watching the combustion; a first-class furnace. \$50.00
- 1444 Combustion Furnace, Bunsen's. Each burner having separate stopcock.
- | | | | | |
|--------------------|---------|-------|-------|-------|
| Length....in. | 14 | 19 | 25 | 31 |
| Width.....burners. | 10 | 15 | 20 | 25 |
| Each..... | \$18.00 | 24.00 | 30.00 | 36.00 |

COMPASSES



No. 1446



No. 1450

POCKET MAGNETIC COMPASSES

Best Make, Stout Gilt Brass Box, Pull-Off Cover

- 1446 Silvered, untarnishable dial, best tempered edge bar needle, with jewel cap and stop.

Size	inches	1½	2	2½
Price	each	\$2.00	2.25	2.75

- 1448 Pocket compasses, similar to 1446 but cheaper grade.... .50 .75 1.00

POCKET MAGNETIC COMPASSES

Hunter Case, Secret Spring, Nickel Case

- 1450 Silvered metal untarnishable dial, best hardened and tempered edge bar needle, jewel cap and self-acting stop.

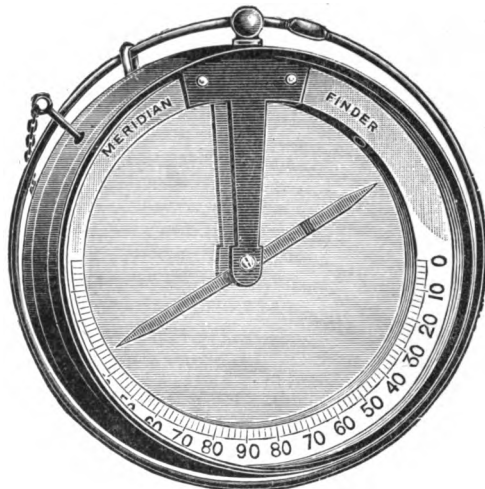
Size	inches	1½	1¾
Price	each	3.00	3.25

We are prepared to quote prices for duty free importation on all classes of goods for educational institutions.

COMPASSES



No. 1452



No. 1454

1452 Bronzed Metal Case Sight Compass, with cover, untarnishable metal dial, tempered edge bar needle jewel cap, automatic stop.

Price, 2-inch \$6.00

Price, 3-inch 8.75

MINER'S COMPASS OR DIPPING NEEDLE

1454 In the hands of the prospector the Miner's Compass or Dipping Needle proves a serviceable guide to the discovery and location of magnetic iron ore. In this instrument the magnetic needle is carefully balanced upon a horizontal axis within a graduated circle, and in which the needle will be found to assume a position inclined to the horizon. This angle of deviation is called the inclination or dip, and varies in different latitudes, and even at different times in the same place. Hence, in reading the dip for the suspected presence of magnetic iron ore, the observer must not only be governed by his instrument, but must also draw into requisition his knowledge of the general geological formation of the place of his survey; and dependant on his experience, he will be enabled to approximate as to the probable mass and depth of the ore from the surface. When used for tracing ore the observer should hold the ring in his hands and keep the needle north and south, standing with his face to the west. The inclination of the needle as read off on the graduated scale will show the dip. If the compass is held horizontally it serves of course as an ordinary compass.

Price, with 3-inch Dip Needle in Velvet Lined Case \$12.00
 Same as No. 1454 Norwegian pattern needle gimballed 20.00

Prices on any compass not listed here furnished on application, see also TRANSITS, pages 389 to 393.

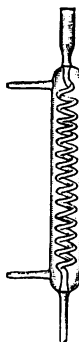
CONDENSERS



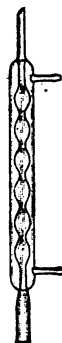
No. 1456



No. 1458



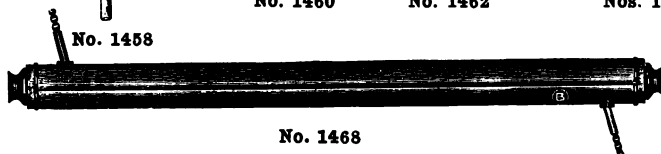
No. 1460



No. 1462



Nos. 1464-1466



No. 1468

1456	Condensers, Liebig's. Glass, with rubber connections.						
	Body.....inches	12	15	18	20	24	30 40
	Each.....	\$1.00	1.10	1.20	1.35	1.50	2.00 3.00
1458	Condensers Liebig's. With condensing tube sealed in the glass body.						
	Body.....inches			10	12	15	20
	Each.....			\$0.85	1.00	1.20	1.40
1460	Condensers. Glass, with condensing tubes in form of coil, sealed into water jacket, with adapter fused on.						
	Length of jacket.....inches			10	12	15	
	Each.....			\$1.80	2.00	2.50	
1462	Condensers, Allihn's. All glass.						
	Body.....inches		8	10	12	16	
	Each.....		\$1.00	1.20	1.40	1.60	
1464	Condensers, Soxhlet's. Ball shape, all glass.						
	Diameter.....inches			4	5		
	Each.....			\$3.50	5.00		
1466	Condensers, Soxhlet's. Ball shape, of metal, nickel-plated, diam., 4 in.						\$3.00
1468	Condensers, Liebig's. Brass, inside tube of glass.						
	Length.....inches		12	15	20	30	40
	Each.....		\$2.50	3.00	3.50	4.50	6.00
1470	Condensers, Hallock's. Of copper, with pure block of tin condensing coil; has two rods for support; size, 14½ x 4 inches.....						\$6.00



No. 1472

1472	Condenser Tubes. Of German glass, with adapters.					
	Length.....inches	20	25	30	35	40
	Each.....	\$0.25	.35	.45	.55	.65

Condensers. See also Stills and Condensers, pages 366, 367

CORKS



No. 1478



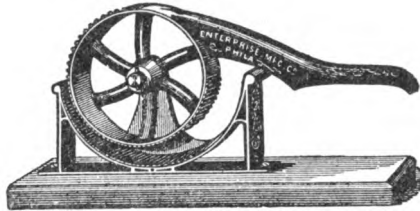
No. 1482



No. 1484



No. 1488



No. 1490



No. 1492

1474 Corks, Tapering. Regular length, XX quality.

No.....	1	2	3	4	5	6	7	8	9	10
Diam. small end, in. ..	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{5}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{4}$
Gross.....	\$0.20	.20	.25	.30	.35	.40	.50	.60	.75	.90
No.....	11	12	14	16	18	20	22	24	26	
Diam. small end, in.....	$\frac{1}{2}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{3}{4}$	
Gross.....	\$1.00	1.20	1.40	1.80	2.20	2.60	3.40	4.00	4.30	

1476 Corks, Flat. For wide mouth bottles. Superior XX quality.

Diam. large end.....in.	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{3}{4}$		
Gross.....	\$0.80	1.00	1.40	1.60	1.80	2.00	2.40		
Diam. large end.....in.	$1\frac{1}{8}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3	$3\frac{1}{2}$		
Gross.....	\$3.00	3.50	4.50	6.00	8.00	11.00	14.00		
Dozen.....	\$0.30	.35	.40	.60	.80	1.00	1.25		

1478 Cork Borers. Hard brass, well finished.

Sets of pieces (number).....	3	6	9	12	15
Each.....	\$0.60	1.00	1.75	2.25	3.00

1480 Cork Borers. Of hard drawn steel, nickel-plated; set of 6 pieces \$3.00

1482 Cork Borer Sharpener. Each 1.00

1484 Cork Knives..... .20

1486 Cork Plates. Size, 4 x 12 inches, XX quality.

Thickness.....inches	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{5}{8}$
Each.....	\$0.15	.25	.35	.50	.75

1488 Cork Press. Lever model, each \$0.35

1490 Cork Press. Rotary, for small and large corks, each..... 1.00

1492 Corkscrews. Good quality, each25

GRAPHITE CRUCIBLES

THEIR CARE AND USE

Many foundrymen do not fully appreciate the importance of keeping and handling their crucibles in a manner which will insure the greatest number of heats with the least danger of accidents, and this is published to emphasize this point.

The importance of the subject seems to be underestimated, and crucible users will find it to their advantage to give the matter more thought and attention, and instruct their furnace men, melters and other employees accordingly.

As any defect in, or accident to, a crucible is an exceedingly annoying as well as an expensive matter, and as such occurrences are in most cases due to improper or careless methods in the annealing or handling of crucibles, the suggestions embodied on this page should prove valuable, as they are the result of long experience and the best thought and knowledge on the subject.

It is very important that the crucible should be properly annealed in a temperature of at least 250 degrees Fahrenheit before using.

Concerning a proper method of annealing, there can be no fixed rule, as conditions differ; but it is the general practice to anneal on the top of the furnace, although some foundries are equipped with a furnace used exclusively for this annealing purpose, and it is an interesting fact that such foundries never have "scalped" crucibles.

Whether annealing in a special furnace or on top of the crucible furnace, there are four points that must be observed:

First: The temperature must go above 250 degrees Fahrenheit.

Second: This temperature should be reached gradually.

Third: This temperature must be held a sufficient time to allow the moisture to thoroughly disappear.

Fourth: The crucible must go in the crucible furnace with a temperature above 250 degrees Fahrenheit.

For example, with a No. 200 crucible it should take at least ten hours to bring it up to this degree. It should "soak" in the heat fully ten hours and then be charged and go in the furnace at about this heat.

Some foundries practice the first, second and third rules perfectly and "fall down" entirely on the fourth by hurriedly and carelessly taking the crucible from the furnace and placing it on damp sand or a cold furnace floor and allowing it to stand there indefinitely before charging.

A failure to comply with this fourth rule counteracts all that the other three have accomplished, and the crucible maker may be informed that his pots are "no good."

Unless the annealing is carefully done, however, hidden cracks, flaws or fissures may be present which, under strong heat, may cause pin holes and similar defects to make their appearance.

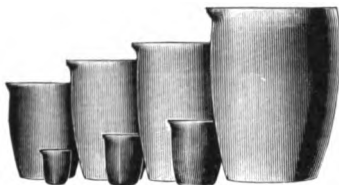
Pin holes are one of the chief difficulties that the user of crucibles meets. Crucibles do not usually show this defect until they have been in use for some time. It seems to require a number of heats to develop this defect.

Pin holes are usually discovered by metal dropping down into the furnace pit, and when the crucible is removed a stream of metal will be found trickling down its side.

Pin holes are probably small fissures developed either during the drying or the annealing of a crucible, and there seems to be no way of avoiding an occasional defect of this kind.

NOTE—Courtesy of Joseph Dixon Crucible Co., from their booklet "Crucibles, Their Care and Use."

CRUCIBLES



No. 1494

1494 Crucibles, Black Lead or Plumbago.

Nos.	Holding Capacity Liquid Measure			Height Outside	Diam. at the Top Outside	Diam. at the Bilge Outside	Price Each
0	$\frac{7}{32}$ pt.	2 in.	$1\frac{1}{2}$ in.	$1\frac{5}{8}$ in.	\$.25
00	$\frac{1}{8}$ pt.	$2\frac{3}{4}$ in.	$1\frac{7}{8}$ in.	$1\frac{7}{8}$ in.	.25
000	$\frac{1}{8}$ pt.	$2\frac{1}{2}$ in.	$1\frac{7}{8}$ in.	$2\frac{1}{8}$ in.	.25
0000	$\frac{1}{4}$ pt.	3 in.	$2\frac{3}{8}$ in.	$2\frac{1}{2}$ in.	.25
1	$\frac{1}{2}$ pt.	$3\frac{5}{8}$ in.	$3\frac{1}{4}$ in.	3 in.	.30
2	$\frac{3}{4}$ pt.	$4\frac{1}{2}$ in.	$3\frac{3}{4}$ in.	$3\frac{5}{8}$ in.	.35
3	1 pt.	$5\frac{1}{4}$ in.	$4\frac{1}{4}$ in.	$4\frac{1}{8}$ in.	.40
4	$1\frac{1}{8}$ pt.	$5\frac{5}{8}$ in.	$4\frac{5}{8}$ in.	$4\frac{1}{2}$ in.	.45
5	$1\frac{1}{2}$ pt.	6 in.	$4\frac{7}{8}$ in.	$4\frac{3}{4}$ in.	.50
6	1 qt.	$\frac{1}{2}$ pt.	$6\frac{1}{2}$ in.	$5\frac{1}{4}$ in.	$5\frac{1}{8}$ in.	.60
7	1 qt.	$\frac{1}{4}$ pt.	$6\frac{3}{4}$ in.	$5\frac{1}{2}$ in.	$5\frac{1}{2}$ in.	.70
8	1 qt.	$\frac{1}{2}$ pt.	$7\frac{1}{4}$ in.	$5\frac{3}{4}$ in.	$5\frac{7}{8}$ in.	.75
9	1 qt.	$\frac{3}{4}$ pt.	$7\frac{5}{8}$ in.	$5\frac{7}{8}$ in.	6 in.	.80
10	1 qt.	1 pt.	8 in.	6 in.	$6\frac{1}{2}$ in.	.85
12	2 qt.	pt.	8 in.	$6\frac{1}{4}$ in.	$6\frac{3}{4}$ in.	Nos. 12-20 inclusive $7\frac{1}{2}$ cts. per No.
14	....	2 qt.	1 pt.	$8\frac{1}{2}$ in.	$6\frac{7}{8}$ in.	$7\frac{3}{8}$ in.
16	....	2 qt.	1 pt.	$8\frac{3}{4}$ in.	7 in.	$7\frac{1}{2}$ in.
18	....	3 qt.	1 pt.	$9\frac{5}{8}$ in.	$7\frac{1}{2}$ in.	8 in.
20	1 gal.	qt.	pt.	$10\frac{1}{4}$ in.	$7\frac{7}{8}$ in.	$8\frac{3}{8}$ in.	
25	1 gal.	qt.	1 pt.	$10\frac{1}{4}$ in.	8 in.	$8\frac{1}{2}$ in.	
30	1 gal.	1 qt.	1 pt.	$11\frac{1}{4}$ in.	$8\frac{5}{8}$ in.	$9\frac{1}{4}$ in.	
35	1 gal.	2 qt.	1 pt.	$11\frac{5}{8}$ in.	$9\frac{1}{4}$ in.	$9\frac{3}{4}$ in.	
40	2 gal.	qt.	pt.	$12\frac{3}{8}$ in.	$9\frac{1}{4}$ in.	$10\frac{1}{4}$ in.	
45	2 gal.	1 qt.	pt.	13 in.	$9\frac{3}{4}$ in.	$10\frac{1}{2}$ in.	
50	2 gal.	3 qt.	pt.	$13\frac{3}{8}$ in.	$10\frac{1}{8}$ in.	$11\frac{3}{8}$ in.	No. 25 and upward $7\frac{1}{4}$ cts. per No.
60	3 gal.	qt.	pt.	14 in.	$10\frac{1}{2}$ in.	$11\frac{5}{8}$ in.	
70	3 gal.	1 qt.	pt.	$14\frac{5}{8}$ in.	$10\frac{3}{4}$ in.	12 in.	
80	3 gal.	2 qt.	1 pt.	$15\frac{1}{8}$ in.	$11\frac{1}{4}$ in.	$12\frac{3}{4}$ in.	
90	4 gal.	qt.	pt.	$15\frac{3}{4}$ in.	$11\frac{3}{8}$ in.	$12\frac{1}{2}$ in.	
100	4 gal.	2 qt.	1 pt.	$16\frac{1}{8}$ in.	$11\frac{7}{8}$ in.	$13\frac{1}{8}$ in.	
125	4 gal.	3 qt.	1 pt.	$16\frac{1}{2}$ in.	$12\frac{1}{2}$ in.	$13\frac{3}{4}$ in.	
150	6 gal.	3 qt.	pt.	$18\frac{1}{2}$ in.	13 in.	$14\frac{5}{8}$ in.	
200	9 gal.	3 qt.	1 pt.	$20\frac{1}{4}$ in.	$14\frac{7}{8}$ in.	$16\frac{1}{2}$ in.	
300	12 gal.	2 qt.	pt.	22 in.	$16\frac{1}{4}$ in.	$17\frac{1}{2}$ in.	

1496 Crucible Covers, Black Lead.

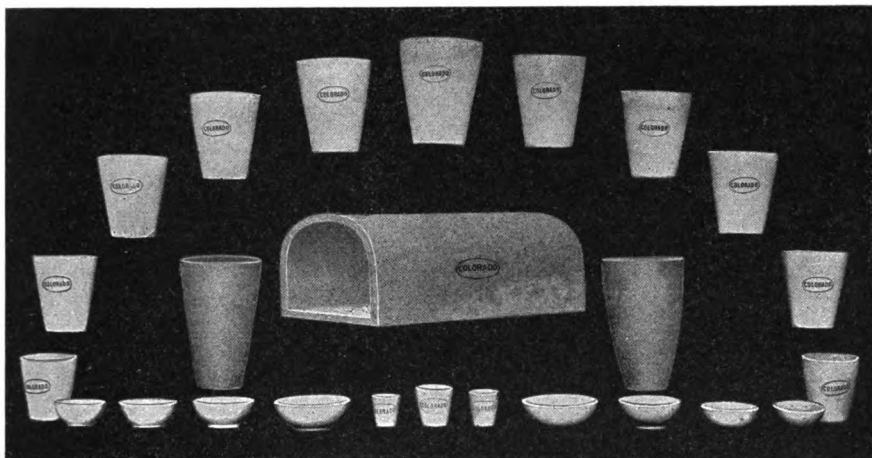
No.	1	2	3	4	5	6	7	8	10	12
Each	\$.20	.20	.20	.20	.20	.25	.25	.25	.30	.35

All sizes of covers above No. 12 per No. at $2\frac{1}{2}$ cts.

1498	Crucible Stirrers, Black Lead.	Length $14\frac{1}{2}$ in.	each	\$0.60
1500	Crucible Stirrers, Black Lead.	Length 9 in., Mint size	each	.40
1502	Crucible Stirrers, Fire Clay.	Length 16 in.	each	.20

STEELE-HARVEY CRUCIBLES AND RETORTS, Quoted upon Application.

COLORADO CLAY GOODS



Colorado Clay Goods, for which we are sole agents, are manufactured from the highest grade clay by expert clay workers of many years of experience, making use of many experiments upon all different makes, as well as their own. We can say with confidence that the "Colorado" Crucibles, Scorifiers and Muffles will give the assayer entirely satisfactory service, and reduce his expense for these items to a minimum.

These crucibles are not excelled for cleanness of pouring and evenness of cutting; as the bottom is small, the lead button is not spread out over a large surface and in danger of a portion being lost.

Crucibles are subjected to the most severe service imaginable. The abrupt heating induces strains due to expansion which are hard to withstand. In addition to this, they are subjected to a chemical action on account of the charge within. Our crucibles will meet these most exacting necessities, but in order to reduce the strains to a minimum, we wish to state the following:

MAXIMS FOR THE CARE OF CRUCIBLES

1. Crucibles, on account of the texture necessary, must be more or less fragile, and despite the utmost care in packing, there is bound to be some breakage, or at least cracking in transit. It is well, therefore, to examine crucibles before use for such cracks, tapping them to hear the clear ring of sound crucibles, as otherwise a crack too small to be noticed casually may cause considerable annoyance, loss of time and patience and damage to the muffle.

2. Crucibles should be dry before use. In putting crucibles into a furnace, it is well to bring up the heat as evenly as possible. Clay is a very poor conductor of heat, and the crucible may be very hot in one spot and considerably cooler on the inside or on the other side, thus producing a very severe strain. This is especially true of open crucible furnaces where the gasoline flame strikes the crucible directly. In the Colorado Furnace, this objection has been overcome.

In putting crucibles into a hot coke fire, it is well to put on a little fresh fuel and then set the crucibles in this green fuel.

3. Remember that the flux may not only act upon the ore, but also upon the crucibles, and sometimes a slight change in the flux will not make the slag less liquid and yet may reduce the corroding effect upon the crucible considerably. The introduction of a little silica often protects the crucible, and makes the slag more fluid.

By not going ahead heedlessly, and by observing the few suggestions given above, the wear and tear on crucibles is considerably reduced, and an assayer can often get several more melts out of them, and furthermore save himself time and annoyance through loss of work.

COLORADO CRUCIBLES

CRUCIBLES

1504 Crucibles, Colorado Clay. High form, for gasoline or open furnace work.								
Number.....	D or 6	E	F	G or 40	I	J	K	L
Price per C.....	\$3.50	5.50	6.00	8.00	10.00	12.00	13.50	24.00
Height.....in.	4	4½	5	5½	6	6½	7¼	8
Diam. at top.....in.	2¼	3	3½	3¾	4	4¾	4¾	5¼
No. to bbl.....	500	350	300	200	150	100	75	50
Gross wt.....lbs.	235	275	270	260	240	240	210	190

Crucibles in less than barrel lots, \$0.25 to \$0.50 per hundred higher.

1506 Covers for No. 1504								
Size for	D or 6	E	F	G or 40	I	J	K	L
Price per C.....	\$2.25	3.50	4.00	5.00	5.50	6.00	8.75	8.75



No. 1508



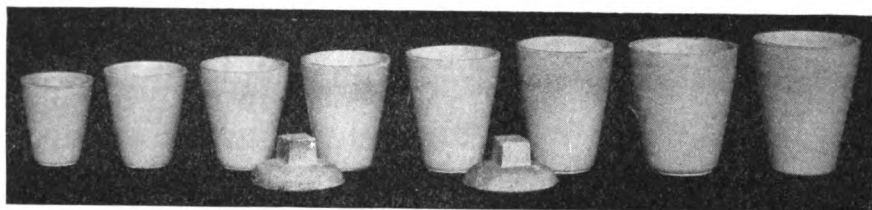
No. 1510

1508 Crucibles, Battersea, Clay. Round form.									
No.....	A	B	C	D	E	F	G	H	J
Height.....in.	2½	3	3½	4	4½	5	5½	5¾	6½
Diam.....in.	1¾	1¾	2¼	2¾	2¾	3	3¾	3¾	4¾
Per 100.....	\$1.85	2.25	3.25	3.60	5.75	6.25	8.60	9.00	13.00
Covers.									
Per 100.....	\$2.25	2.25	2.25	2.25	3.25	4.25	5.50	6.50	6.50
No.....	K	L	M	N	O	P	Q	R	
Height.....in.	7¼	8	8½	9¾	10	11	12	13	
Diam.....in.	4¾	5¼	5¼	6½	7	7¾	8¾	9¾	
Per 100.....	\$13.50	24.00	28.00	39.00	58.00	64.00	73.00	100.00	
Covers.									
Per 100.....	\$8.75	8.75	10.75	13.00	15.00	17.25	17.25	21.50	

1510 Crucibles, Battersea, Clay. Colorado Form. For lead, hard.						
Capacity	grams	5	10	12	15	20
Height	in.	2¾	3½	3¼	3½	3¾
Diameter	in.	2¼	2½	2¾	2¾	3
Per 100		\$2.75	3.50	3.50	3.50	4.50

Battersea, Colorado Assay. For lead, soft. Same prices as above.

COLORADO CLAY CRUCIBLES



No. 1512

1512 Crucibles, Colorado Clay. These crucibles are made in both hard and soft burn, the hard being the most generally used.

Capacity.....	5	10	12	15	20	30	35	40
*Price per 100....	\$2.50	3.00	3.00	3.00	4.00	6.00	6.00	8.00
Height.....in.	2 $\frac{5}{8}$	3	3 $\frac{1}{4}$	3 $\frac{1}{2}$	3 $\frac{3}{4}$	3 $\frac{7}{8}$	4 $\frac{3}{4}$	5 $\frac{5}{8}$
Diam. at top....in.	2 $\frac{3}{8}$	2 $\frac{5}{8}$	2 $\frac{3}{4}$	2 $\frac{7}{8}$	3	3 $\frac{1}{2}$	3 $\frac{3}{4}$	3 $\frac{5}{8}$
No. to bbl.....	900	550	450	400	350	300	275	200
Gross wt.....lbs.	260	240	230	220	235	255	265	260

*Crucibles in less than barrel lots, \$0.25 to \$0.50 per hundred higher.

1514 Covers for No. 1512

Size for.....	5	10	12	15	20	30	35	40
Price per 100....	\$2.25	2.25	2.25	2.25	3.50	4.00	4.00	5.00

1516 Crucibles, Colorado Clay. Tall, narrow form, superior for gas, gasoline, or coke furnaces.

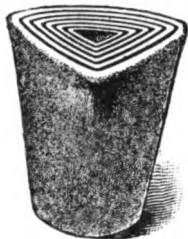
Number.....	6 or D	8	9
* Price per 100.....	\$3.50	7.00	8.00
Height.....in.	4	5	5 $\frac{1}{4}$
Diam. at top.....in.	2 $\frac{1}{4}$	2 $\frac{1}{2}$	3
No. to bbl.....	500	300	275
Gross wt.....lbs.	235	280	270

* Crucibles in less than barrel lots, \$0.25 to \$0.50 per hundred higher.

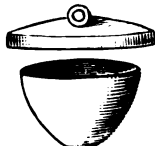
1518 Covers for No. 1516

Size for.....	6 or D	8	9
Price per 100.....	\$2.25	2.25	3.50

CRUCIBLES



No. 1520



No. 1522



No. 1526



No. 1538



No. 1540

1520 Crucibles, Hessian Sand. Triangular, in nests.

No. in nest.....	3	5
Height of largest.....inches	4	4½
Width on top.....inches	3	3¾
Nest.....each	\$0.10	.15

1522 Crucibles, Royal Berlin Porcelain. Without covers, glazed inside and outside.

No.....	000	00	0	1	2	3	4	5
Diameter.....inches	1	1¼	1½	1¾	2	2½	3	3½
Capacity.....ounces	¼	½	¾	1	1¼	3½	6	10
Price.....each	\$0.09	.12	.20	.25	.30	.40	.50	.60

1524 Crucible Covers. For above..... \$0.03 .03 .04 .05 .05 .08 .08 .10

1526 Crucibles, Royal Meissen Porcelain. Without covers, glazed inside and outside.

No.....	1	2	3	4	5	6	7	8	9	10	11
Diameter...inches	3¼	2¾	2½	2¼	1¾	1½	1¾	1¼	1	¾	½
Capacity...ounces	6	4½	3½	2	1½	1¼	1	½	¼	⅛	⅙
Price.....each	\$0.45	.30	.25	.20	.17	.15	.14	.13	.12	.10	.09

1528 Crucible Covers.

For above.....	\$0.15	.12	.05	.05	.05	.05	.03	.03	.03	.04	.05
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NOTE—Upon request of many of our customers we also carry a stock of Royal Berlin Crucibles of a size between the 000 and 00, similar in dimensions to Royal Meissen No. 8.

Price.....each \$0.10

In ordering, specify R. B. No. 8

1530 Crucibles of German Porcelain. Royal Berlin shape, glazed.

No.....	000	00	0
Capacity.....cc.	10	13	15
Price.....each	\$0.07	.07	.09



1532 Crucibles, Unglazed Porcelain, Rose's. With perforated cover and tube.

Capacity.....ounces	½	1	2
Price.....each	\$0.50	.60	.90

1534 Crucible Tubes and Covers, Rose's

Price.....	\$0.35	.40	.70
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Nos. 1532-1534

1536 Crucibles, Unglazed Porcelain. Lipped, with cover.

Capacity.....cc.	125	250	500
Price.....each	\$0.40	.50	.70

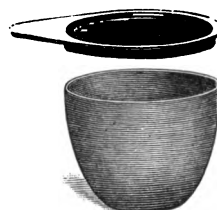
1538 Crucibles, Royal Meissen Porcelain, Gooch's. With perforated bottom and cover, Meissen form..... \$0.40

1540 Crucibles, Royal Meissen Porcelain, Caldwell's. With cover and small rim instead of bottom to hold perforated disk; conical form..... .50

CRUCIBLES



No. 1542



No. 1544

1542 Crucibles, made of sheet iron, with lid.

Capacitycc.	20	50	100	200	400
Diameterinches	1½	2½	2½	3½	3¾
Heightinches	1¼	1½	2	2½	3
Priceeach	\$0.25	.30	.40	.50	.75

1544 Crucibles, of sheet copper, with lids.

Capacitycc.	20	30	50	75	100	150	250
Diameterinches	1½	1½	1¾	2	2½	2¾	3¼
Heightinches	1½	1¾	2	2¼	2½	2¾	3¼
Priceeach	\$0.40	.50	.60	.70	.80	.90	1.00

1546 Crucibles, of sheet nickel, for alkaline fusions.

Capacitycc.	20	30	50	75	100	250	500
Diameterinches	1½	1½	1¾	2	2½	3¼	4
Heightinches	1½	1¾	2	2¼	2½	3¼	3½
Priceeach	\$0.40	.50	.60	.60	.70	1.00	1.50

1548 Crucible Covers for above....\$0.20 .25 .30 .30 .35 .50 .75

1550 Crucibles, of pure silver, with lids.

Capacitycc.	20	30	50	75	100	150
Diameterinches	1½	1½	1¾	2	2½	2¾
Heightinches	1½	1¾	2	2¼	2½	2¾
Weight (about) gram	35	45	60	80	100	150
Price, per gramme	\$0.10					

Crucibles of Platinum. See Platinum, pages 331, 332.

CRUCIBLES



No. 1552



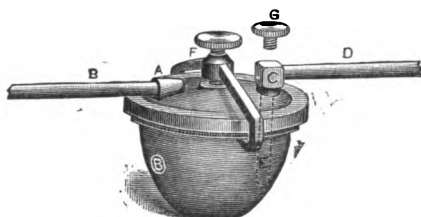
No. 1554

1552 Crucibles. Cast iron with cover.

Capacity.....	1 pt.	1 qt.	½ gal.	1 gal.	2 gal.
Each.....	\$2.25	2.50	3.00	4.00	6.00

1554 Crucibles. Of pure fused silica, not transparent.

No.	Outside Measurement, Inches		Price
	Height	Diam. at Top	
00	¾	1⅝	\$0.60
0	1	1⅝	1.60
1	1½	1⅞	1.75
2	1⅞	2¼	.90
3	1¾	2⅝	1.25
4	2	2	1.25



Nos. 1556-1558

This crucible is made for making oxygen from MnO_2 , calcination of chalk with recovery of the expelled CO_2 , manufacture of soda from cryolite, preparation of ammonia, destructive distillation of coal, wood or other organic substances, or for any use in which the materials employed or evolved do not act destructively on hot iron.

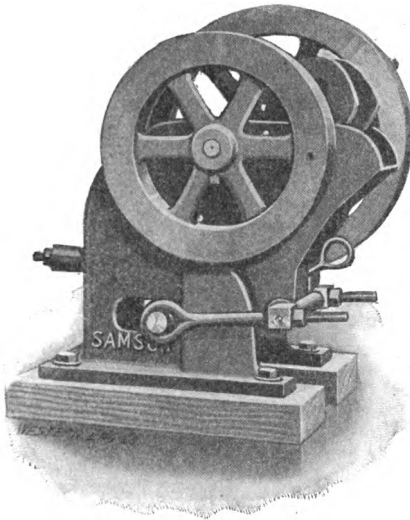
The cover is clamped air-tight to the rim by means of a strong clamp F and an asbestos packing ring. The exit tube B enters by a straight run at A, which admits of the ready removal of tar or other material which might obstruct the outlet. The delivery tube D, which is used when a substance is to be treated in a current of gas or special atmosphere, enters the head of a screw plug, C, and is extended, when desirable, to the bottom of the interior by a short tube which screws into the bottom of the plug. When the delivery tube is not wanted, C is removed and the solid plug G inserted instead.

1556 Normal School Crucible. 1½ oz. capacity	\$1.00
1558 Same, 6 oz. capacity	2.00

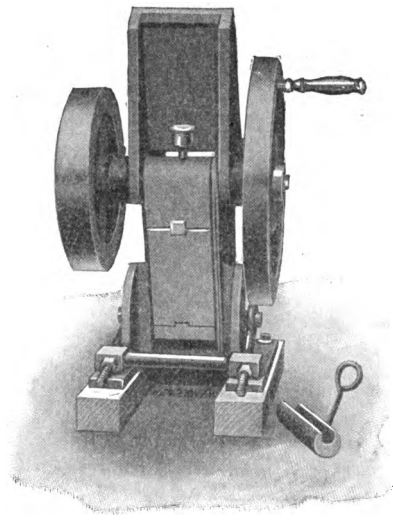
SAMSON LABORATORY CRUSHERS

No. 00

CLOSED



OPEN FOR CLEANING



No. 1560

1560 For laboratory and assay office use, the No. 00 Samson Laboratory Crusher is one of the best machines of its kind on the market.

It is extremely simple, has a large capacity, requires only a limited amount of power, and can be operated either by hand or with a belt.

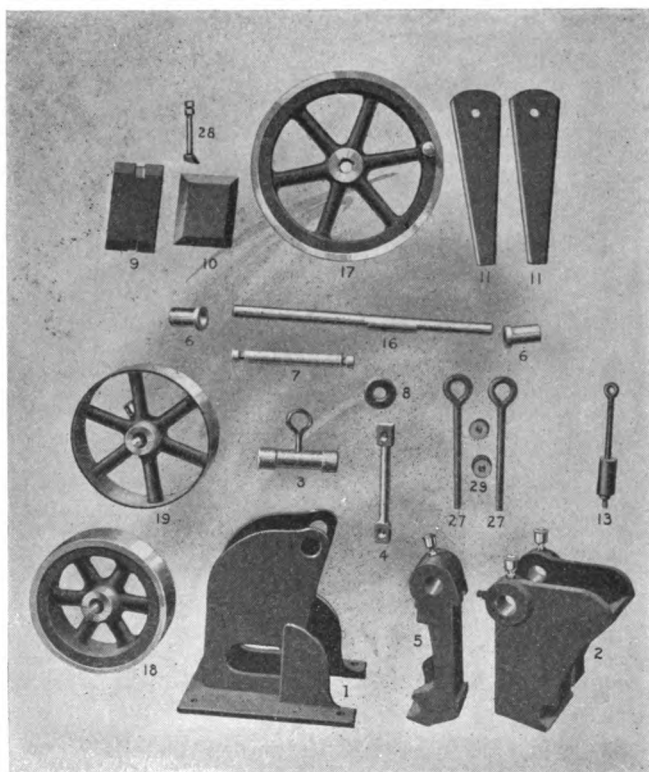
It can be easily cleaned, as shown in the cut, by pulling down the eye bolt on the front oscillating journal seat. This allows the front journal to drop down, the swinging frame that holds the stationary jaw plate to be turned up as shown, exposing the stationary as well as the movable and side plates for cleaning. No tools are required to open and close this crusher, and the time required is but an instant; it can be opened and cleaned while running at full speed.

Jaw Opening Inches	Size Pulley Inches	Speed R. P. M.	Weight Pounds	Price Hand and Power	Price with T. and L. Pulley
1½x4]	12x2½	500	250	\$55.00	\$60.00

SAMSON LABORATORY CRUSHERS

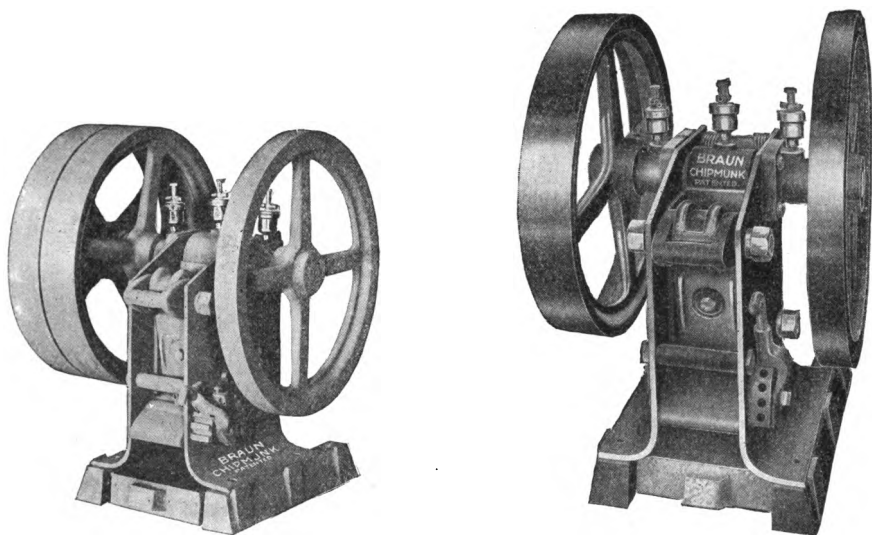
No. 00

REPAIR PARTS



No.	Description	Price
1	Main Frame.....	\$10.00
2	Swinging Frame.....	8.00
3	Front Oscillating Journal Seat	2.00
4	Front Oscillating Journal	2.00
5	Jaw.....	6.00
6	Eccentric Shaft Journal Boxes (2).....	each 2.25
7	Rear Tie Bar Shaft	1.00
8	Collar .....	.75
9	Movable Jaw Plate, Steel	2.50
10	Stationary Jaw Plate, Steel ..	2.50

No.	Description	Price
11	Cheek Plates, Hard Iron (2) per pair	\$1.25
13	Eyebolt and Spring.....	.75
16	Eccentric Shaft, Tight Pulley only	5.00
16	Eccentric Shaft, T and L Pulley	5.50
17	Flywheel	4.00
18	Flywheel Pulley	6.00
19	Loose Pulley.....	3.00
23	Tie Bar Nuts (2)	each .25
27	Tie Bars (2).....	each .75
28	Jaw Plate Bolt.....	.25

BRAUN IMPROVED CHIPMUNK CRUSHERS**Nos. 1562-1568**

In the improved chipmunk crusher herewith presented many changes have been made from the original pattern as formerly supplied. The height of the steel frames has been reduced and broadened so as to give the machine greater rigidity. Vibration is reduced to a minimum.

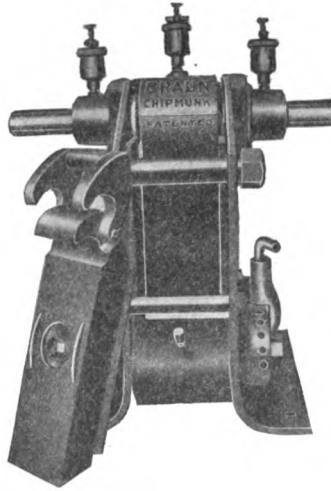
A New Feature. In the 1911 model we have improved the adjusting device. This consists of an eccentric bolt passing through the adjusting block. By moving the lever at the side of the machine backward it decreases the opening between the jaws; by moving it forward or towards the operator, it increases this opening. A safety clamp is placed in one of the notches which prevents the stationary jaw being brought in contact with the movable jaw.

All bearings are fitted with grease cups.

The vibratory jaw is mounted upon an eccentric at its upper end and rests against a toggle near its lower end. The eccentric imparts a circular or gyratory movement to the upper end, while the toggle compels the lower end to describe an arc of a small circle. This motion is both forward and downward and impels a discharge.

Agents for Braun Laboratory Appliances.

BRAUN IMPROVED CHIPMUNK CRUSHERS



Nos. 1562-1568

The frame is made of steel, each side being made in one piece, and both rigidly secured together with strong studs. Strength, durability, and lightness were secured by the employment of steel frames.

No. 3 IMPROVED CHIPMUNK CRUSHER

This is one of our latest designs, being much larger, stronger, and of larger capacity than the types formerly offered. The steel frames have been shortened and widened, and when mounted on the special blocks furnished with each machine there is very little vibration. It is fitted with heavy flywheels, which reduces the power required for operation to a minimum. It has the largest capacity of any crushing device with jaws of similar size; when hand fed it will reduce rock from about $2\frac{1}{4}$ inches down to $\frac{1}{4}$ mesh and smaller at the rate of 1000 to 1500 pounds per hour, and when fed through a hopper, from 1500 to 2000 pounds per hour. In repeated trial runs we have found it impossible to choke this machine. The peculiar motion of the rear jaw which is both forward and downward (a rubbing motion) impels a discharge.

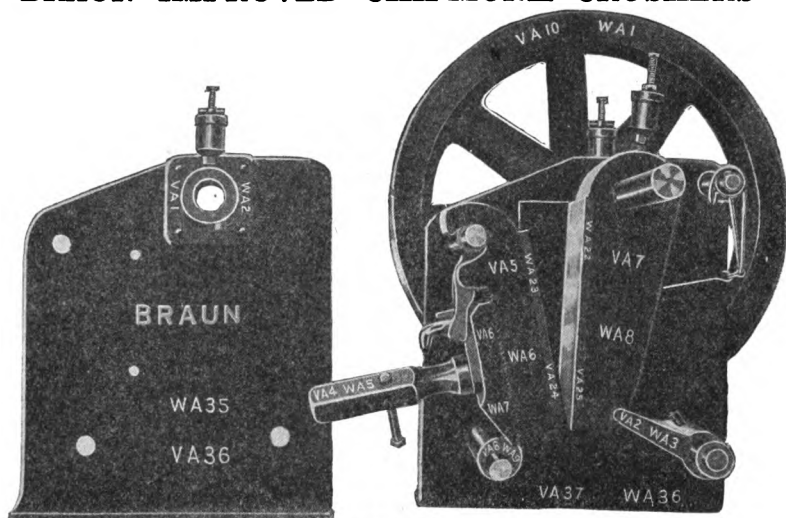
IMPROVED CHIPMUNK CRUSHERS

No.			Code Word	Net Wt. Lbs.	Shipping Wt. Lbs.	Price
1562	1.	Hand and power	Dar	136	180	\$ 45.00
1564	1A.	Power, tight and loose pulleys	Daret	169	225	55.00
1566	3.	Hand and power	Dires	271	340	110.00
1568	3A.	Power, tight and loose pulleys	Diror	327	410	125.00

Prices are net F. O. B. Denver, Salt Lake, El Paso or Los Angeles.

Agents for Braun Laboratory Appliances.

BRAUN IMPROVED CHIPMUNK CRUSHERS



Nos. 1 and 3

RENEWAL PARTS FOR No. 1 IMPROVED CHIPMUNK CRUSHERS

When ordering extra parts mention serial number of your machine. It is stamped on top of frame plate.

VA 1. Bearing Boss.....	\$2.00	VA 23. Cap Screw for Cheek Plates, each.....	\$0.10
VA 2. Toggle.....	1.00	VA 24. Jaw Plate for Stationary Jaw.....	.50
VA 3. Dog for Stationary Jaw.....	.25	VA 25. Jaw Plate for Movable Jaw.....	.50
VA 4. Hand Nut on Stationary Jaw.....	1.00	VA 26. Cheek Plates, each.....	.40
VA 5. Stationary Jaw.....	3.50	VA 27. Grease Cup.....	.65
VA 6. Adjusting Block.....	.75	VA 28. Key for Pulleys, each.....	.10
VA 7. Movable Jaw.....	5.00	VA 29. Ore Pan.....	.50
VA 8. Spacer at Bottom of Stationary Jaw.....	3.00	VA 30. Bolts and Washers for Mounting, per set.....	.50
VA 10. Power Pulley.....	6.00	VA 31. Handle with Bolt and Washers.....	.15
VA 11. Hand Wheel.....	4.00	VA 32. Shaft for Tight and Loose Pulleys.....	8.00
VA 12. Pipe Spacer.....	.10	VA 33. Loose Pulleys.....	6.00
VA 13. Machine Bolt for above.....	.10	VA 34. Collar.....	.40
VA 14. Spring for Movable Jaw.....	.50	VA 35. Raising Blocks, per pair.....	1.50
VA 15. Hook for Spring.....	.10	VA 36. Frame Plate, Right, with Bearing Boss.....	8.00
VA 16. Stud for Frame.....	.25	VA 37. Frame Plate, Left, with Bearing Boss.....	8.00
VA 17. Studs for Frame, each.....	.50	VA 38. Oilier for Toggle.....	.25
VA 20. Shaft, H. & P.....	6.00		
VA 21. Cap Screw for Movable Jaw Plate.....	.10		
VA 22. Cap Screw for Stationary Jaw Plate.....	.10		

RENEWAL PARTS FOR No. 3 IMPROVED CHIPMUNK CRUSHER

When ordering renewal parts mention serial number of your machine. It is stamped on top of frame plate.

WA 1. Tight Power Pulley.....	\$12.00	WA 5. Hand Nut.....	\$2.00
WA 2. Bearing Boss, each.....	5.00	WA 6. Stationary Jaw.....	7.00
WA 3. Toggle.....	2.00	WA 7. Adjusting Block.....	1.50
WA 4. Dog.....	.35	WA 8. Movable Jaw.....	10.00

Prices are net F. O. B. Denver, Los Angeles, El Paso and Salt Lake City.

Agents for Braun Laboratory Appliances.

BRAUN IMPROVED CHIPMUNK CRUSHERS

RENEWAL PARTS

FOR No. 3 IMPROVED CHIPMUNK CRUSHER

WA 9.	Spacer at bottom of Stationary Jaw.....	\$5.00
WA 11.	Shaft, H. & P.....	8.00
WA 12.	Hand Wheel.....	8.50
WA 13.	Shaft, T. & L.....	13.00
WA 15.	Spring for Movable Jaw.....	.75
WA 16.	Hook for Spring.....	.10
WA 17.	Stud for Toggle.....	1.50
WA 18.	Stud for Stationary Jaw at top.....	1.50
WA 22.	Movable Jaw Plate.....	.75
WA 23.	Stationary Jaw Plate.....	.75
WA 24.	Cheek Plate, each.....	.50
WA 25.	Cap Screw for Movable Jaw Plate.....	.10
WA 26.	Cap Screw for Stationary Jaw Plate.....	.10
WA 27.	Cap Screw for Cheek Plate, each.....	.10
WA 28.	Grease Cups, each.....	.75
WA 29.	Keys for Pulleys, each.....	.10
WA 30.	Ore Pan.....	.75
WA 31.	Bolts and Washers for mounting, per set.....	.50
WA 32.	Raising Blocks, per pair.....	1.50
WA 33.	Loose Pulley.....	12.00
WA 34.	Collar.....	.40
WA 35.	Frame Plate, right, with bearing boss.....	18.00
WA 36.	Frame Plate, left, with bearing boss.....	18.00
WA 37.	Pipe Spacer.....	.25
WA 39.	Handle with bolt and washer.....	.25
WA 40.	Oiler for Toggle.....	.50

BRAUN LABORATORY CRUSHERS

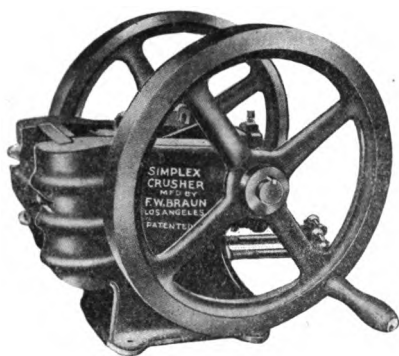
Style of Crusher	Capacity in Pounds per Hour	Speed R. P. M.	SIZE OF PULLEYS INCHES		H. P.	Size of Jaws Inches
			Diam.	Face		
Improved Chipmunk						
No. 1 power.....	300 to 400	400	16	2½	1	6 x 3
No. 1A, T. & L. pulleys....	300 to 400	400	16	2½	1	6 x 3
No. 3 power.....	1000 to 1500	400	20	3	2	9 x 4
No. 3A, T. & L. pulleys....	1000 to 1500	400	20	3	2	9 x 4
Simplex						
Power.....	100 to 125	200	16	2½	¼	6 x 3
T. & L. pulleys.....	100 to 125	200	16	2½	¼	6 x 3

Style of Crusher	Opening of Jaws Inches	DIMENSIONS OVER ALL INCHES			Net Weight Pounds	Shipping Weight Pounds	Price Each
		Length	Width	Height			
Improved Chipmunk							
No. 1 power.....	1¾	18	13½	21	136	180	\$45.00
No. 1A, T. & L. pulleys....	1¾	18	16	21	169	225	55.00
No. 3 power.....	2⅝	20	19	24½	271	340	110.00
No. 3A, T. & L. pulleys....	2⅝	20	24	24½	327	410	125.00
Simplex							
Power.....	2	19½	13	18	162	197	33.00
T. & L. pulleys.....	2	19½	15½	18	195	245	40.00

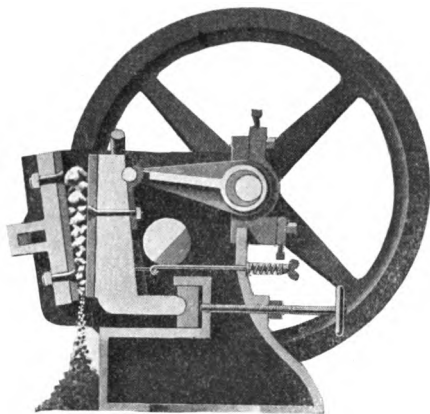
Prices are net, F. O. B. Denver, Salt Lake, El Paso or Los Angeles.

Agents for Braun Laboratory Appliances.

BRAUN SIMPLEX CRUSHERS



HAND MACHINE



SECTIONAL VIEW

Nos. 1570-1572

AN IDEAL LABORATORY CRUSHER FOR HAND OR POWER

(Patented April 15, 1902)

The simplex ore crusher is designed for crushing small samples of ore by hand. We manufacture the same machine with broad wheel for belt for those desiring to use power.

Important features of this machine are: The ease with which it may be opened for cleaning and the simplicity of its adjustment.

One blow of a hammer loosens the wedge holding the non-vibrating jaw in place, allowing this jaw to be lifted out, thereby giving sufficient access for ordinary cleaning; to further expose the interior of this crusher, the vibratory jaw can be swung clear of its chamber without removing a bolt, screw or nut, and without the use of a tool or wrench of any kind.

The complete opening and closing of this machine for cleaning does not take one minute, not including the time occupied in cleaning.

The fineness of the product obtained is regulated by increasing or diminishing the size of the discharge or lower opening of the jaws; this can be accomplished by a few turns of two regulating screws, which have hand wheels, obviating the necessity for use of wrench or tools.

This machine can be adjusted to crush ore to a fine powder or the size of a coffee bean. When very fine crushing is desired, time will be saved by running ore twice through the machine, the first time set as wide as possible, and the last time at its maximum fineness.

The parts of the simplex crusher which bear the strain are all sufficiently strong for the purpose. The steel jaw plates are reversible and can easily be removed for renewal when necessary.

A motor of $\frac{1}{2}$ H. P. is sufficient to operate this crusher. The best results are obtained if the machine is speeded to about 200 revolutions per minute.

Capacity, per hour, to $\frac{1}{4}$ inch and smaller, 100 pounds.

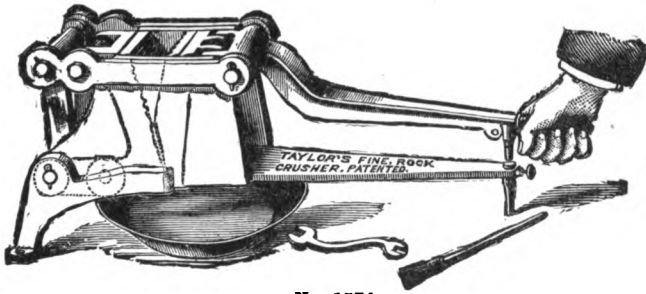
PRICES

	Net Wt. Lbs.	Shipping Wt. Lbs.	
1570 For hand	154	190	\$30.00
1572 For power	162	197	33.00

Prices are net F. O. B. Denver, Salt Lake City, El Paso and Los Angeles.

Agents for Braun Laboratory Appliances.

TAYLOR ROCK CRUSHERS



No. 1574

1574 A most powerful hand crusher, suitable for prospectors as well as assayers for working specimen ores, crushing old crucibles, etc. This small machine will enable a person to quickly and easily bring the hardest ores to a fine powder, and to readily crush a larger sample than can be done in a mortar. The construction of this crusher is such that the size of the discharge opening does not vary when the machine is operated, consequently when the jaws are set close together a product of uniform fineness is obtained. It is possible to pulverize an entire sample to a very fine mesh with one feeding through this machine.

The adjustment for a coarse or fine product is instantly made by turning the knob shown in the above illustration directly under the hand.

The straps are made of steel, the stationary and vibratory jaw plates are chilled iron, the frame and hand lever are made of cast iron; all parts of this crusher are sufficiently strong to withstand hard usage.

Each machine has a cover (not shown in illustration) to prevent pieces of ore from flying out, and is furnished with a wrench and dust brush.

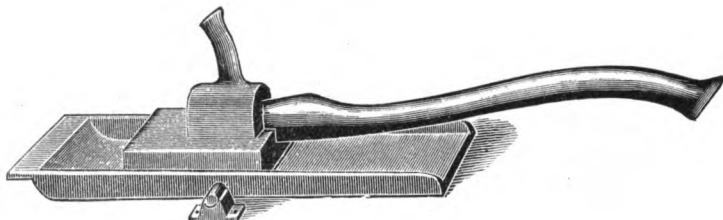
DIMENSIONS

Total height.....	13 inches
Total width.....	10 inches
Total length.....	36 inches
Length of jaws.....	6½ inches
Width of jaws.....	3 inches
Opening of jaws.....	2¼ inches

WEIGHTS

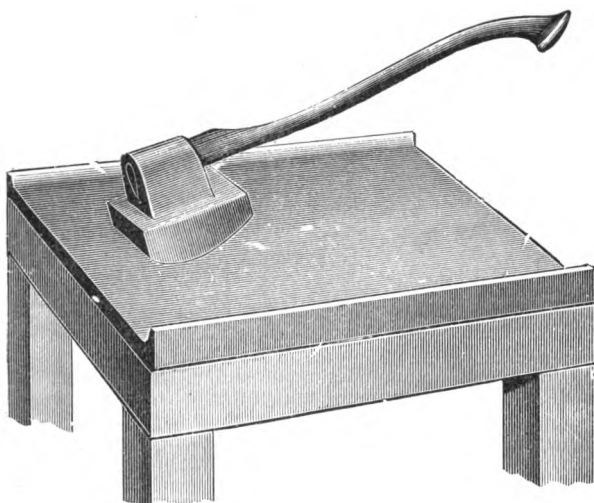
Net weight.....	88 pounds
Shipping weight.....	110 pounds
Price.....	\$25.00

CRUSHERS

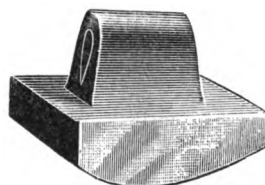


No. 1576

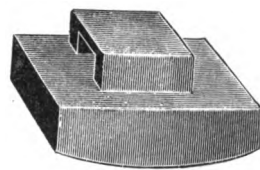
- 1576 Bucking Board and Muller. On trunnions, smooth castings. Size 7x28 inches, weight of plate, 37 pounds, Muller 36 pounds, complete. \$10.00



No. 1578



No. 1580A



No. 1580B

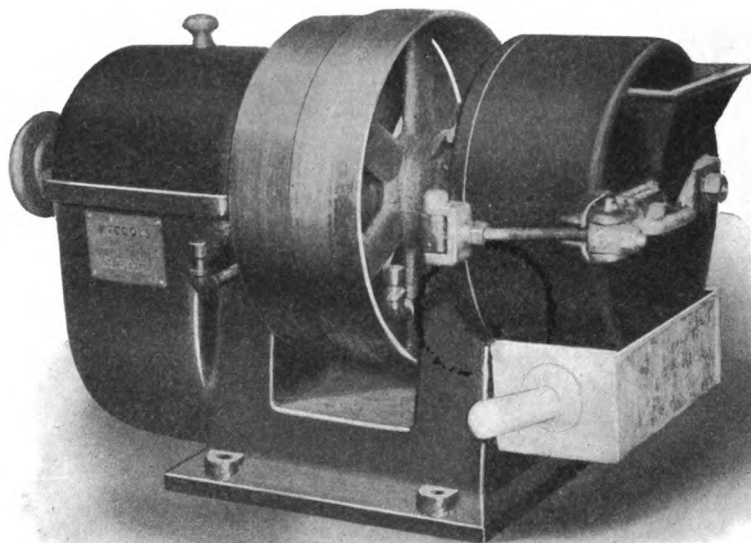
- 1578 Bucking Board and Muller. For quickly reducing ore to a fine powder, of iron 1 inch thick, planed smooth on grinding side, and having flange on two sides 1½ inches high. Supplied with either round or flat faced muller.
- | | | | | | | |
|------------------|--------|-------|-------|-------|-------|-------|
| Size.....inches | 12x18 | 18x20 | 20x24 | 24x30 | 24x36 | 30x36 |
| Weight....pounds | 15 | 15 | 20 | 25 | 25 | 35 |
| Price.....each | \$3.00 | 12.00 | 15.00 | 18.00 | 19.00 | 25.00 |

NOTE. Round mullers which take regular axe handle, are always supplied (except the 35-lb. muller with the 30x36-inch which is flat); flat mullers take pick handles.

- 1580 Crushers, Extra Mullers. Small, medium and large, with best hickory handles, per pound. \$0.12
- 1582 Crushers, of Hardest Chrome Steel. Plates are 18x24 inches and weight about 115 pounds each. Rubbers are 8x7 inches, and weight about 30 pounds each. Both the face of the plate and the face of the rubber are machined. "Does not grind off into the sample." Used by the U. S. Steel Corporation for crushing iron ore and recommended by the Chemist's Committee in their "Uniform Methods."
- | | |
|--------------------------|-------|
| Plate and rubber.....net | 45.00 |
|--------------------------|-------|

McCOOL PULVERIZERS

The Mine And Smelter Supply Co., Sole Agents
(PATENTS PENDING ON MACHINE, ITS DISCS AND PARTS)



Nos. 1584-1586

THE McCOOL PULVERIZER fills a need long felt by assayers for a machine which will grind a sample of either hard or soft ore quickly to a very fine mesh, and which is easily cleaned; and moreover a machine which is so perfect in mechanical design and workmanship that it always works satisfactorily, and requires a minimum of care. They are practically noiseless in operation.

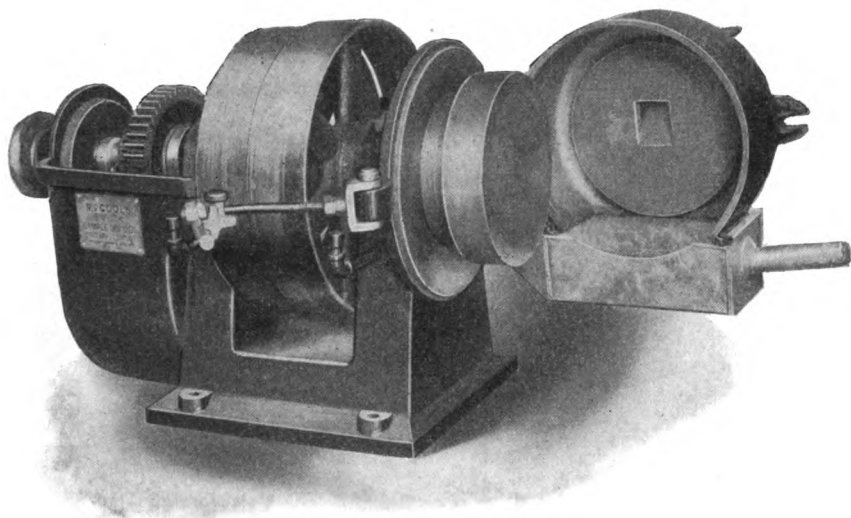
The **GRINDING** is accomplished by a compound movement between two plane discs, one being stationary and the other having a double movement—a revolution on its own shaft and an eccentric rotation due to the revolution of a hollow shaft in which the disc shaft has an eccentric journal. This gives a rubbing action which reduces the ore quickly, and which keeps the disc free from corrugation and in perfect condition until worn out.

The discs may be changed in less than two minutes, and are the only wearing part necessary to replace; their cost being low, the cost of repairs is negligible. They are made of a composition determined after very careful experimenting to give the greatest durability consistent with rapid grinding. The rotating disc is attached to its shaft, so that it is free to adjust itself to the plane of the stationary disc, and the annoying period which occurs on other machines while the discs are wearing to a fit for proper grinding is avoided. This is accomplished by a ball and socket joint which takes the thrust of the grinding.

The **ADJUSTMENT** for fineness of grinding may be made when the machine is running, by simply turning a handwheel which automatically locks in position.

McCOOL PULVERIZERS

OPEN FOR CLEANING AND REMOVAL OF SAMPLE



Nos. 1584-1586

The **CLEANING** and removal of the ground sample is easily and quickly accomplished, as the machine is opened or closed by one operation; being held closed by a lever cam clamp. The sample drawer is attached to the front case, which is hinged, and anything adhering to the case or stationary disc can be brushed into the pan. The rotating disc is entirely exposed for cleaning, and all the surface of the grinding chamber is machined smoothed. It is dust-tight, and samplers report no loss of value through dust, nor is there danger of salting, even with ordinary care after rich ore.

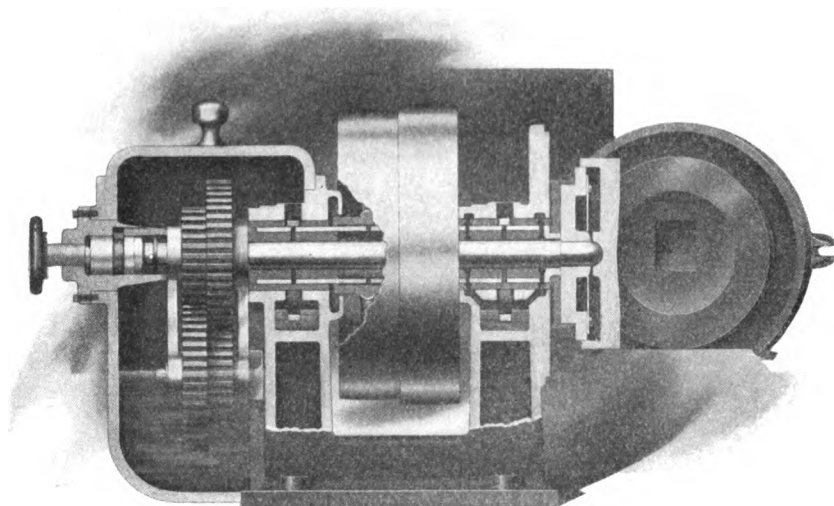
The **CAPACITY** of the McCool Pulverizer is especially large. The small size will reduce an 8 ounce sample to 100 mesh in 30 seconds; the large size will reduce a one pound sample to 100 mesh in 30 seconds. The capacity, of course, is dependent largely upon the character of the ore, the size and the mesh of the feed, and also upon the desired mesh of the product.

The **MECHANISM** is not complicated, being only the application of old standard devices to a machine for a special purpose. The belt pull is taken by a journal on either side of the pulley which is of large diameter and ample width. The tight pulley drives the hollow shaft, which in turn drives the disc shaft, which is eccentric in it, through a set of cut gears similar to the back gears on a lathe. In designing the machine, particular attention was paid to the lubrication, which is automatic and very similar to that of a high speed engine. The journals and the loose pulley are served by ring oilers, and the gears run in oil noiselessly in a closed chamber. It is only necessary to see that the proper level is kept in this chamber, which serves as a reservoir, and the machine will last indefinitely, being practically **FOOL-PROOF**.

The machines are sold strictly on their merits, and any one acquainted with machinery will on first sight be convinced of their superiority.

McCOOL PULVERIZERS

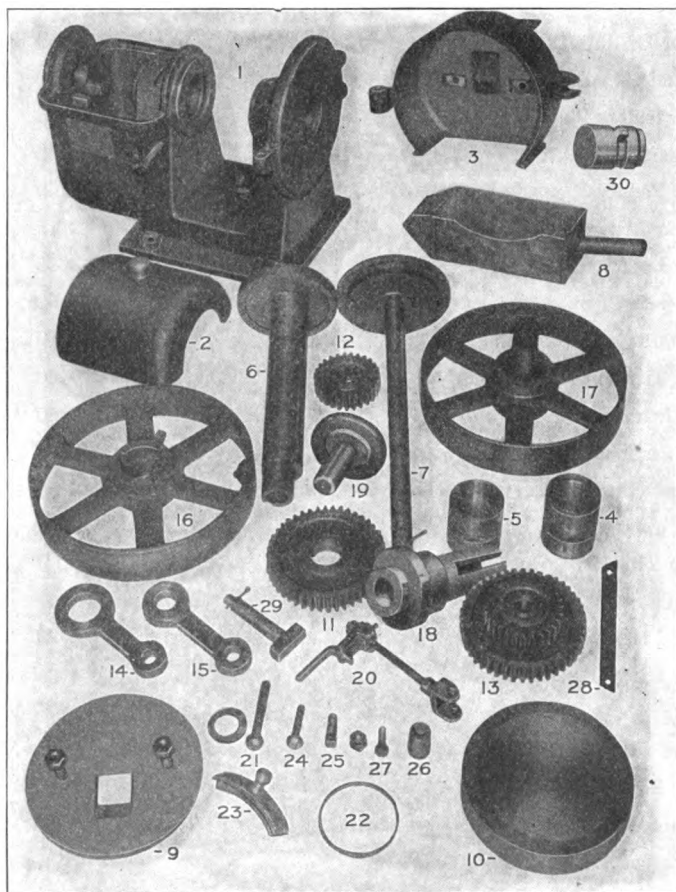
SHOWING MECHANISM



Nos. 1584-1586

	Small Size	Large Size
No.....	1584	1586
Price, Complete Machine.....	\$100.00	\$175.00
Price, Extra Discs per set	6.00	7.50
Diameter of Discs	6 inches	9½ inches
Face of Pulleys.....	3 inches	3 inches
Diameter of Pulleys.....	11 inches	15 inches
Pulley Speed recommended	300 R.P.M.	225 R.P.M.
Horse Power.....	1 H.P.	2 H.P.
Shipping Weight	330 pounds	510 pounds
Length over all.....	30 inches	34 inches
Height over all.....	14½ inches	20 inches
Width over all.....	11 inches	15 inches

For illustration and prices of repairs, see two following pages.

McCOOL PULVERIZERS**REPAIR PARTS**

In ordering repairs, be sure to give the number as shown in above engraving, and style of machine repair is for.

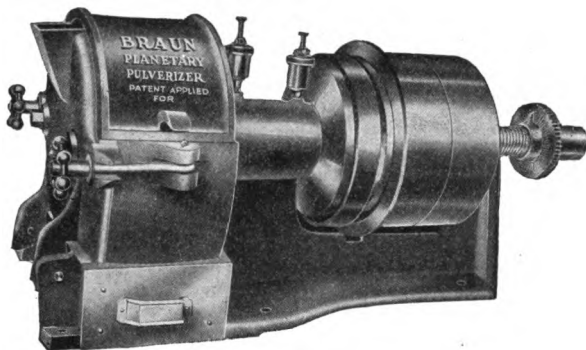
McCOOL PULVERIZERS**REPAIR PARTS****PRICE LIST**

No.		Small or 6-inch	Large or 9½-inch
1.	Frame.....	\$30.00	\$49.00
2.	Gear Cover.....	2.00	4.00
3.	Hopper or Grinding Chamber.....	8.50	11.50
4.	Front or Disc End Bushing, or Journal.....	3.00	4.00
5.	Rear End Bushing.....	3.00	4.00
6.	Main or Hollow Shaft with Dust Guard.....	11.00	16.00
7.	Disc Shaft with Disc Driver.....	8.00	13.50
8.	Sample Pan.....	3.50	4.00
9.	Stationary Disc with Cap Screws.....	2.75	3.50
10.	Rotary Disc.....	3.25	4.00
11.	Main Shaft Gear.....	6.00	8.00
12.	Disc Shaft Gear.....	5.00	6.00
13.	Double Transmission Gear.....	10.50	13.50
14.	Front Gear Hanger.....	2.50	3.50
15.	Rear Gear Hanger.....	2.50	3.50
16.	Driving Pulley.....	3.50	4.50
17.	Loose Pulley.....	3.50	4.50
18.	Locking Thrust Bearing.....	2.00	2.75
19.	Adjusting Screw.....	4.00	5.50
20.	Hopper Lock.....	3.25	3.25
21.	Hopper Hinge Pin.....	1.25	1.50
22.	Oil Ring.....	.75	1.00
23.	Oil Hole Dust Guard.....	.50	.75
24.	Hopper Lock Pin.....	.40	.50
25.	Main Bearing Set Screw with Lock Nut.....	.25	.35
26.	Transmission Drive Holder.....	.75	1.00
27.	Transmission Holder Cap Screw.....	.15	.25
28.	Disc Driver Spring.....	.50	.60
29.	Pin for Double Transmission Gear.....	1.00	1.50
30.	Thrust Block.....	1.50	2.00

In ordering repairs, be sure to give the number, as shown on the previous page, and style of machine repair is for.

BRAUN SAMPLE GRINDERS THE PLANETARY PULVERIZER

CLOSED



No. 1588

The simplicity of construction to obtain the planetary movement with the assurance that there are no expensive parts to be replaced, combined with the fact that it is almost as noiseless in operation as the regular Braun Pulverizer with which nearly every laboratory operator is acquainted, will commend the Braun Planetary Pulverizer to those in need of a machine for grinding all classes of material, whether hard, soft or talcy.

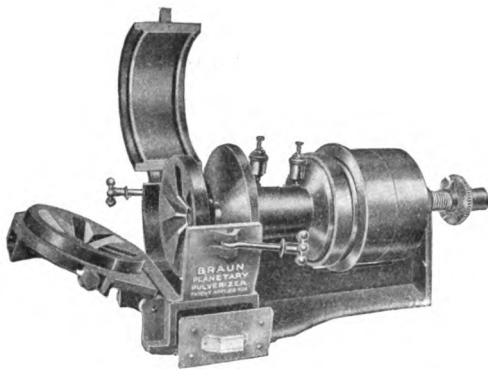
The planetary movement prevents soft material from caking on the plates and insures proper discharge. It also eliminates grooving of the discs which sometimes occurs when grinding hard ores in the regular Braun Pulverizer.

All of the claims made for this machine have our unqualified guarantee and have been substantiated by actual tests.

CAPACITY

One pound of ordinary quartz rock can be ground to 80 mesh in forty seconds or at the rate of 90 pounds per hour. Can be instantly adjusted to pulverize to any fineness while the machine is in operation or at rest.

OPEN



No. 1588

1588 Price with one set of grinding discs (weight, pounds, 350 net, 420 packed) \$150.00

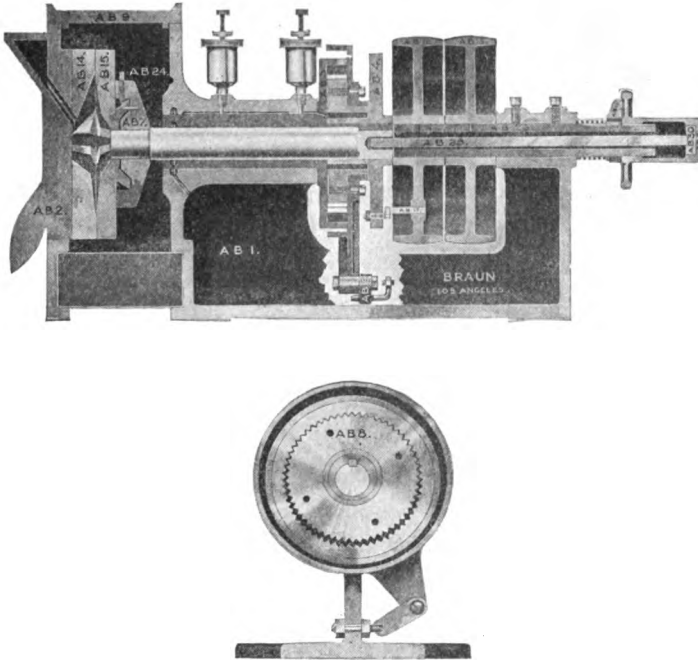
Price extra discs, per set (weight, pounds, 44 net, 60 packed) 15.00

Prices net F. O. B. Denver, Salt Lake, El Paso, or Los Angeles.

Agents for Braun Laboratory Appliances.

BRAUN PLANETARY PULVERIZERS

RENEWAL PARTS

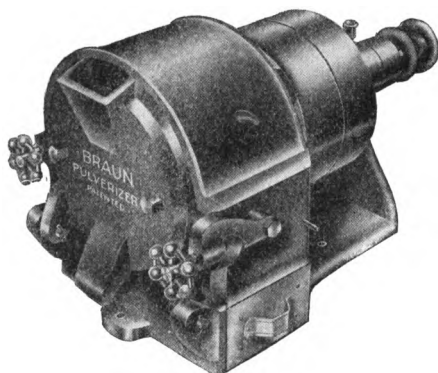
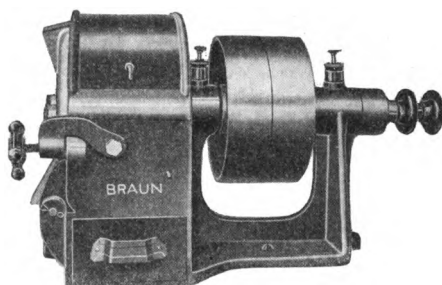


A.B. 1. Frame.....	\$45.00	A.B. 20. Hand Nut for Eye Bolt..	\$ 0.25
A.B. 2. Door.....	20.00	A.B. 21. Bent Pin for Gear Brck't..	.25
A.B. 3. Quill.....	15.00	A.B. 22. Pin for Cover.....	.10
A.B. 4. Drive Plate.....	10.00	A.B. 23. Pin for Eye Bolt.....	.10
A.B. 5. Hand Adjusting Nut.....	1.00	A.B. 24. Set Screw.....	.20
A.B. 6. Gear Bracket.....	5.00	A.B. 25. Long Adjusting Pin.....	.25
A.B. 7. Flange for Movable Disc..	8.00	A.B. 26. Hollow Spindle.....	5.00
A.B. 8. Internal Gear with Bushing	10.00	A.B. 27. Key for A.B. 10.....	.10
A.B. 9. Cover.....	4.25	A.B. 28. Steel Thrust Plate.....	.25
A.B. 10. Dog.....	.50	A.B. 29. Key for Drive Plate.....	.30
A.B. 11. Ore Pan.....	.75	A.B. 30. Fibre Disc.....	.10
A.B. 12. Drive Pulley.....	5.00	A.B. 31. Eye Bolt.....	.25
A.B. 13. Loose Pulley.....	4.00	A.B. 32. Bolt for Gear Bracket....	.40
A.B. 14. Stationary Disc.....	7.50	A.B. 33. Spiral Spring.....	.20
A.B. 15. Movable Disc.....	7.50	A.B. 40. Auto Grease Cup.....	1.25
A.B. 16. Drive Link.....	.40	A.B. 41. Plain Grease Cup.....	.40
A.B. 17. Pulley Pin for Drive Link..	.40	A.B. 42. Brush.....	.75
A.B. 18. Plate Pin for Drive Link..	.20	A.B. 43. Socket Wrench.....	.50
A.B. 19. Link for Gear Bracket....	.25	A.B. 47. Bronze Bushing for A.B.8	4.00

Prices net, F. O. B. Denver, Salt Lake, El Paso or Los Angeles.

Agents for Braun Laboratory Appliances.

THE BRAUN PULVERIZER



No. 1590

This machine has a world-wide reputation. Its increasing demand is attributed solely to quality. In no apparatus are the requirements for efficiency and quality more important than for the reduction of laboratory samples.

This machine will pulverize any material that can be reduced to pulp on the old style bucking board, and will produce a finer powder in less time than any other type on the market.

CAPACITY

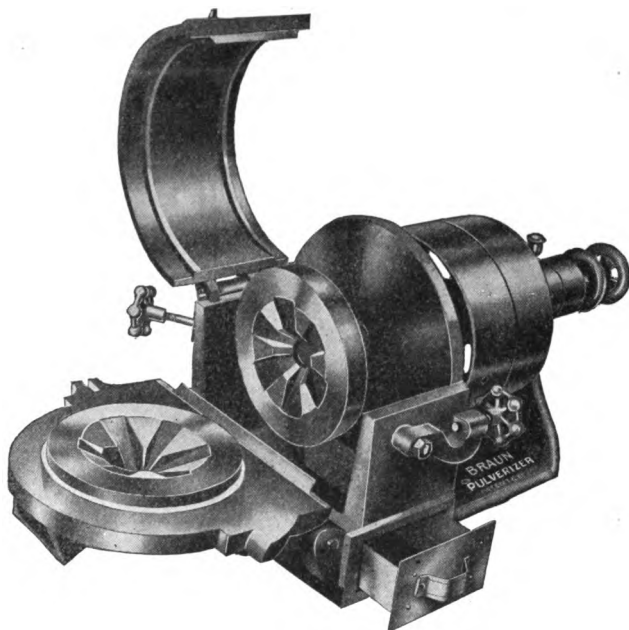
The capacity of the pulverizer depends on the fineness to which the material has been previously crushed. If the product fed into the pulverizer is $\frac{1}{4}$ mesh, it will be slower than if this product were crushed finer before being put through the machine. In several test runs we found that if the material has been crushed to about 10 mesh, the pulverizer will easily handle from 80 to 90 pounds per hour to 100 mesh. If it has been crushed to $\frac{1}{4}$ mesh and smaller (the majority being smaller) it will easily handle 60 pounds per hour to 100 mesh. If large quantities are to be pulverized it will be accomplished in less time if the product is first ground to about 10 mesh and then refed through the machine, grinding this to 100 mesh.

This machine is fed through the spout in the door, and will take ore $\frac{1}{4}$ mesh and smaller (which product may be obtained from any of our laboratory crushers) and reduce it all with one grinding to any desired mesh.

Prices net F. O. B. Denver, Salt Lake, El Paso or Los Angeles.

Agents for Braun Laboratory Appliances.

THE BRAUN PULVERIZER



No. 1590

Cleaning. One of the most striking features in the Braun Pulverizer is the accessibility of all the interior portions for thorough cleaning. The one objection to all mechanical pulverizers has been the danger of salting samples. In the Braun Pulverizer this danger is entirely eliminated as all the interior parts are either enameled or machine finished, allowing the material to be easily brushed into the pan. The manner in which the cover and door of the machine are opened insures ALL OF THE PULP BEING BRUSHED INTO THE PAN, and this feature alone places it far in the lead of other grinders on the market.

Bearings. The bearings in this machine are babbitted and extra long. Grease cups are furnished, and if proper attention is given to the oiling there is no danger of these bearings becoming worn; however, should they become worn from neglect, they can be easily re-babbitted at your nearest machine shop, which service will only cost a trifle.

Speed Recommended. The best average speed at which the Braun Pulverizer should be operated is 850 r.p.m. Power required, 1 h.p.

DIMENSIONS

Total length..... 23 in.
Total width..... 14 in.
Total height..... 14½ in.

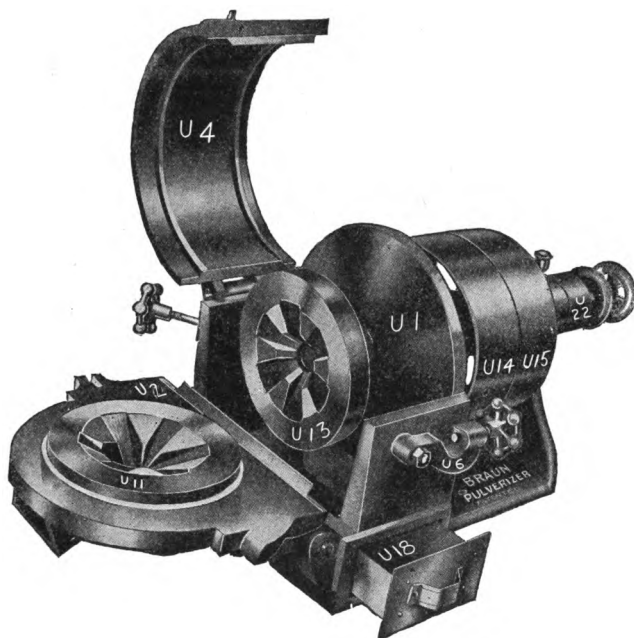
Diameter of pulleys..... 9 in.
Face of pulleys..... 2½ in.
Net weight..... 235 lbs.
Gross weight..... 275 lbs.

PRICES

1590 Braun Pulverizer. Complete, with one set of discs.....\$85.00
Extra discs, per set 15.00
Prices net F. O. B. Denver, Salt Lake, El Paso or Los Angeles.

Agents for Braun Laboratory Appliances.

THE BRAUN PULVERIZER



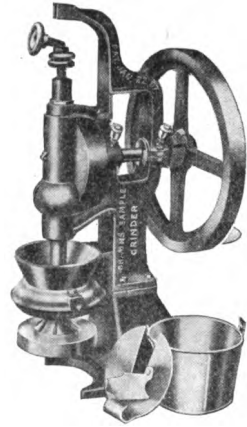
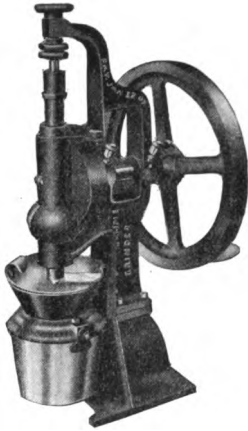
No. 1590

RENEWAL PARTS FOR REGULAR BRAUN PULVERIZER

U 1. Frame.....	\$35.00	U 13. Movable Disc.....	\$ 7.50
U 2. Front Door.....	20.00	U 14. Tight Pulley.....	3.25
U 3. Hinge Pin for Door.....	.15	U 15. Loose Pulley.....	3.25
U 4. Cover.....	4.25	U 16. Adjusting Screw with Nut...	2.00
U 5. Hinge Pin for Cover.....	.15	U 17. Grease Cup.....	.30
U 6. Drop Clutch.....	.65	U 18. Ore Pan.....	.50
U 7. Hand Screw for Clutch.....	.50	U 19. Brass Ring for Dry Cell.....	1.50
U 8. Cap Screw for Clutch.....	.05	U 20. Collar with Set Screws.....	.40
U 9. Eye Bolt with Nut.....	.50	U 21. Steel Washer.....	.10
U 10. Pin for Eye Bolt.....	.15	U 22. Cap for Adj. Screw.....	1.25
U 11. Stationary Disc.....	7.50	U 23. Cap Screws for above.....	.05
U 12. Cap Screws for above.....	.15	U 24. Brush.....	.25

Prices net F. O. B. Denver, Salt Lake, El Paso or Los Angeles.

Agents for Braun Laboratory Appliances.

BRAUN SAMPLE GRINDERS

No. 1592

This machine fills a long felt want for a hand power laboratory grinder. It entirely replaces the "old drudge," the bucking board.

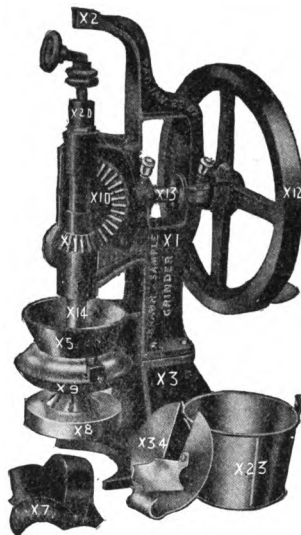
Like all our other machines, this grinder has been designed to meet laboratory requirements. The adjustment may be altered instantly. It is dustproof, and there is no loss of material. The gears are enclosed, obviating all danger. The vertical shaft runs in ball and roller-bearings, and there is little or no friction. The bucket is suspended from two screws and fits closely, making an absolutely tight receptacle which insures the discharge of material into the pan.

The feed chamber is provided with a cover which has a small feed spout fitted with a hinge door. This prevents the loss of any material and makes the machine absolutely dustproof. The entire cover may be removed in a second.

CLEANING

The ease with which this machine can be cleaned will readily appeal to the operator. The revolving disc is lowered and all portions are readily accessible for thorough cleaning.

BRAUN SAMPLE GRINDERS



No. 1592

DIMENSIONS

Total height.....	31 inches
Total width.....	21 inches
Diameter of pulley.....	16 inches
Net weight.....	125 pounds
Weight, packed for shipment.....	160 pounds

PRICE

1592 sample grinder complete, with one set of discs.....	\$50.00
Extra discs, per set.....	10.00

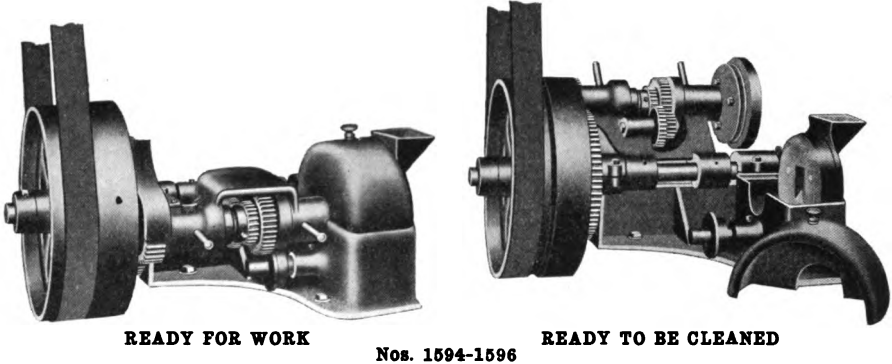
RENEWAL PARTS

X 1. Gear Frame.....	\$10.00	X 21. Steel Ball, each.....	.05
X 2. Top Brace.....	1.50	X 22. Adjusting Screw.....	1.00
X 3. Table Bracket.....	3.00	X 23. Ore Pan.....	.75
X 4. Wall Bracket.....	1.00	X 24. Cap Screw for Stationary Plate.....	.10
X 5. Hopper.....	5.00	X 25. Cap Screw for Hopper.....	.10
X 6. Gear Shield, Right.....	1.00	X 26. Cap Screw for Frame.....	.10
X 7. Gear Shield, Left.....	1.00	X 27. Bottom Cap Screw for Brace.....	.10
X 8. Movable Disc.....	5.00	X 28. Top Cap Screw for Brace.....	.10
X 9. Stationary Disc.....	5.00	X 29. Cap Screw for Bucket.....	.10
X 10. Gear.....	1.50	X 30. Screw for Gear Shield.....	.02
X 11. Pinion.....	1.50	X 31. Thumb Nut for Pan.....	.10
X 12. Hand Wheel.....	4.00	X 32. Pin to hold Pan.....	.05
X 13. Horizontal Shaft.....	.75	X 33. Wood Handle with Bolt.....	.25
X 14. Vertical Shaft.....	7.00	X 34. Cover for Hopper.....	1.50
X 15. Nut for Vertical Shaft.....	.35	X 35. Brush.....	.40
X 16. Rolls for Roller Bearing.....	.10	X 36. Lag Screw, each.....	.05
X 17. Steel Shells for Roller Bearing.....	.50	X 37. Oil Cup.....	.30
X 18. Top Adjusting Nut.....	.50	X 38. Fiber Washer.....	.25
X 19. Lock Nut.....	.50	X 39. Hexagon Nut for Shaft.....	.25
X 20. Ball Bearing Collar.....	6.00		

Prices are net F. O. B. Denver, Salt Lake, El Paso or Los Angeles.

Agents for Braun Laboratory Appliances.

PULVERIZERS



ADVANCE DISC SAMPLE GRINDER

These machines are intended for the use of assayers who realize the importance of a properly ground sample.

The Advance Disc Sample Grinder consists of a main frame or support to which is secured a grinding disc. A rocker-arm, carrying a driven shaft, to one end of which is secured a grinding disc, and having driving gears at the opposite end, is pivotally journaled to the main frame of the machine. When in operation, the disc on the driven shaft is given a double motion, rotating and vibrating. The oscillating or vibrating motion is created by means of an eccentric on the driven shaft, which by rotating against a roller, which is journaled to the main frame of the machine, causes the rocker-arm carrying the driven disc shaft to rise and fall.

The cam or eccentric is not keyed to the disc shaft, but is slowly rotated around the disc shaft by means of gears so as to limit the oscillating motion of the rocker arm and disc to a contracted orbit of travel. This double motion is very destructive to the ore particles, which are fed between the discs from a hopper leading to an opening through the stationary disc, and not only alters the position of the rolling particles between the discs, but prevents the discs from becoming concentrically grooved, which would occur should the disc or discs have a rotary motion only.

The rocker-arm carrying the driven shaft and disc may be lifted or swung over, clear of the opposing disc, to allow both discs to be cleaned of any adhering particles of any sample previously crushed, which might otherwise "salt" the succeeding sample.

1594 Advance Disc Sample Grinder. Power size, like illustration. Diameter of discs, 9 inches; tight and loose pulleys. Weight, 375 pounds. Requires $1\frac{1}{2}$ H. P.

Price \$125.00

Price, Extra Discs each 3.50

1596 Advance Disc Sample Grinder. To be operated by hand power, identical in design with above. The flywheel has a turned and crowned face to take a $2\frac{1}{2}$ -inch belt where it is desired to operate the machine by power.

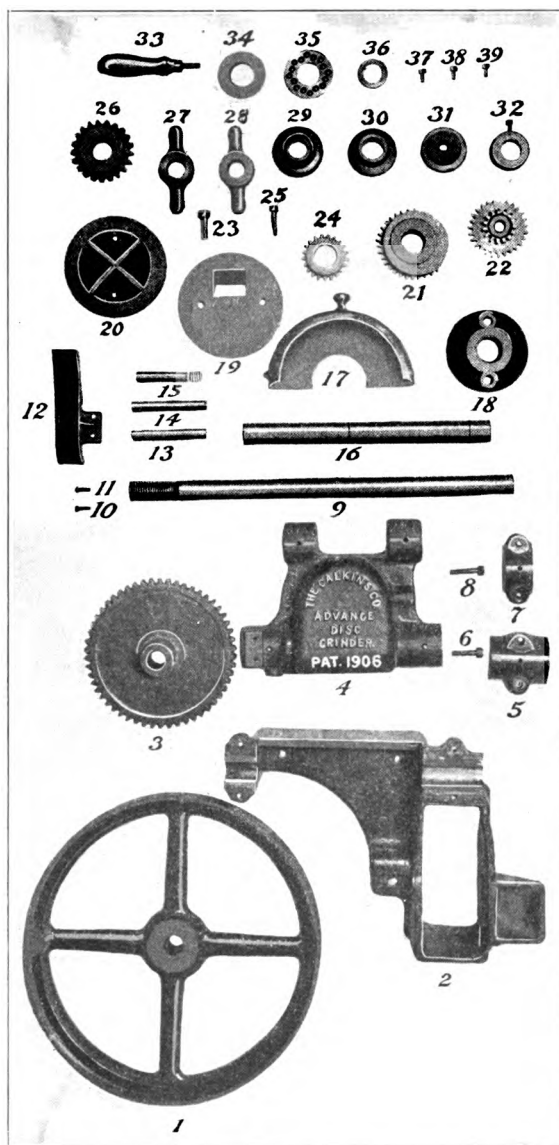
The hand machine will pulverize a 20-ounce sample to 100 mesh in one minute. Diameter of discs, 6 inches; weight, 175 pounds.

Price \$50.00

Price, Fitted with tight and loose pulleys 55.00

Price, Extra Discs each 1.50

ADVANCE DISC SAMPLE GRINDERS



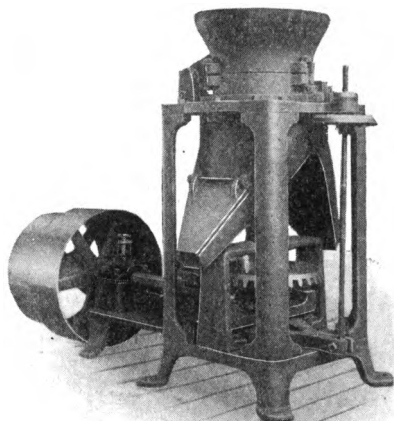
Repair parts for Advance Disc Grinders. For prices, see following page.

ADVANCE DISC SAMPLE GRINDERS

/ REPAIR PARTS—PRICE LIST

No.	Hand Grinder		Power Grinder	
	6-inch Discs		9-inch Discs	
1.	Hand Wheel.....	\$5.00	.....	.....
2.	Main Frame.....	10.00	\$20.00	
3.	Large Outside Gear.....	4.00	8.00	
4.	Upper Part of Frame or Rocker Arm.....	10.00	20.00	
5.	Shaft Box Cap.....	1.00	1.50	
6.	Cap Screws for No. 5.....	.10	.10	
7.	Shaft Box Cap.....	.75	1.00	
8.	Cap Screws for No. 7.....	.10	.10	
9.	Pivot Shaft.....	3.00	4.00	
10.	Screw for No. 12.....	.05	.05	
11.	Screw for No. 12.....	.05	.05	
12.	Shield for Outside Gears, Nos. 3 and 26.....	.50	1.00	
13.	Pin for No. 31.....	.25	.35	
14.	Pin upon which Gear No. 22 runs.....	.25	.50	
15.	Handle for Lifting Rocker Arm, each.....	.50	.50	
16.	Driver Shaft.....	3.50	5.00	
17.	Cover for Discs.....	1.50	2.50	
18.	Iron Plate which fits on Driven Shaft and holds Rotary Disc.....	1.50	2.00	
19.	Stationary Disc.....	1.50	3.50	
20.	Rotary Disc.....	1.50	3.50	
21.	Large Inside Gear with attached cam.....	4.00	6.00	
22.	Inside Lower Double Gear.....	4.00	6.00	
23.	Cap Screws for No. 19.....	.10	.15	
24.	Small Inside Single Upper Gear.....	2.00	3.00	
25.	Cap Screws for No. 20, each.....	.10	.15	
26.	Small Outside Gear.....	2.50	4.00	
27.	Inside Lock Nut.....	.50	1.00	
28.	Outside Lock Nut.....	.50	1.00	
29.	Collar which fits outside of Hand Wheel on Pivot Shaft.....	.50	1.00	
30.	Iron Collar which fits on one side of Ball Bearings.....	.50	.75	
31.	Roller which runs against Eccentric Cam.....	1.50	3.00	
32.	Collar with set screw which fits inside of Gear No. 3 on Pivot Shaft.....	.50	.75	
33.	Handle.....	.50	.....
34.	Iron Washer which fits on one side of Ball Bearings.....	.25	.35	
35.	Ball Bearings on Driven Shaft.....	2.50	3.00	
36.	Ring against which Lock Nut 27 works.....	.50	.25	
37.	Set Screw for No. 29.....	.05	.10	
38.	Set Screw for No. 24.....	.05	.10	
39.	Set Screw for No. 14.....	.05	.10	
A.	Tight Pulley.....	.....	7.50	
B.	Loose Pulley.....	.....	7.50	
C.	Ball Bearings on Pivot Shaft.....	.....	3.00	
D.	Washer for Ball Bearing No. C, outside.....	.....	.50	
E.	Washer for Ball Bearing No. C, inside.....	.....	.35	
F.	Bronze Bushings on Rocker Arm, each.....	2.50	5.00	

IMPROVED ORE-SAMPLE GRINDERS



No. 1598

1598 These machines are designed for the purpose of simplifying and economizing the grinding of ore samples. Grinder No. 2 is simple in construction, compact and extremely durable, and is extensively used by the leading smelters and sampling works. The hopper and grinding ring may be swung open and the cone lifted out and cleaned after the sample has been ground, and when the grinding ring and cone are worn they may be replaced by new ones without difficulty. The grinding parts are made of a hard composition metal and are very durable.

Grinder No. 1 is a lighter machine than No. 2 and about one-half the capacity. It is suitable for mills and sampling works of moderate capacity.

The design varies somewhat from the No. 2 machine.

Number	Revolutions Driving Shaft per Minute	Diameter of Pulleys Inches	Face of Pulleys Inches	Weight Pounds	Price
1	200	24	5	550	\$100.00
2	150	18	6	850	125.00

PRICE LIST GRINDER PARTS

Article	GRINDER No. 1		GRINDER No. 2	
	Weight	Price	Weight	Price
Cone and Ring.....	80	\$8.00	145	\$14.50
Bevel Gear and Pinion.....	35	5.00	50	7.50
Vertical Shaft.....	20	6.00	25	8.00
Hand Wheel.....	8	3.00	8	3.00

CRUSHERS



No. 1600

WEATHERHEAD'S CRUSHER PULVERIZERS

1600 It is easy to clean, as there are no joints or corners for pulverized material to stick in.

It revolves easier when pulverizing material than it does when empty.

It is the only hand machine that discharges the material as soon as pulverized.

The working surfaces are tempered as hard as steel can be tempered, thereby minimizing the wear.

The machine has been in constant use for over twelve years, so that the claims for it have been thoroughly demonstrated.

The cover of the machine is made so it can be used for a small hand mortar, the ends of the handles being rounded to form a pestle.

Price..... \$25.00

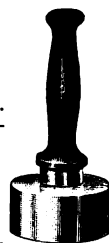
CUPEL MACHINES

1602 Cupel Moulds, Brass. Finely finished.

Dia.	$\frac{3}{4}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{2}$ in.
Each	\$1.75	1.75	2.00	2.25	2.50	3.00	4.00	6.00

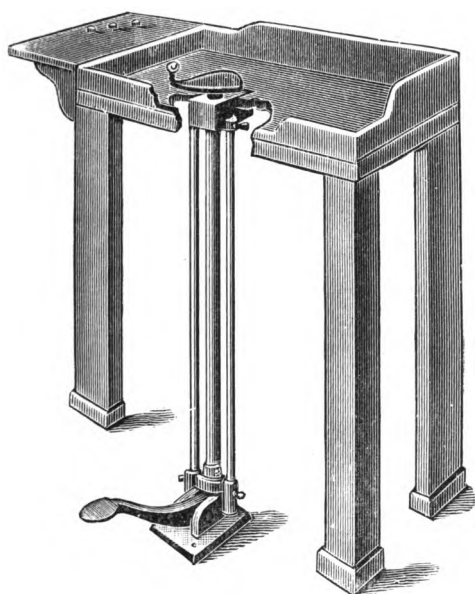
1604 Cupel Moulds, Iron.

Dia.	$\frac{3}{4}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{2}$ in.
Each	\$1.25	1.25	1.35	1.50	1.75	2.00	2.25	3.00

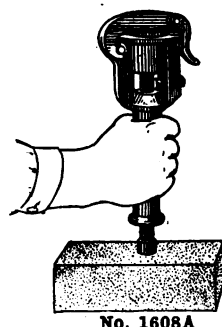


Nos. 1602-1604

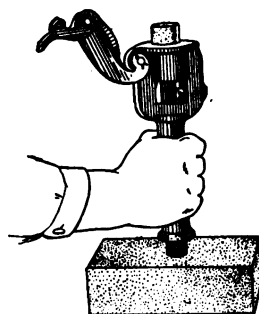
CUPEL MACHINES



No. 1606



No. 1608A



No. 1608B

1606 Machine—Her's Pedal. The most efficient and satisfactory machine made; having a capacity of 500 cupels per hour. It is made in two sizes, the ordinary size making $1\frac{1}{4}$ and $1\frac{1}{2}$ -inch cupels; the large size making $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$ and 2-inch. The changing of the dies to make any of the above sizes is extremely simple and takes less than a minute; all dies of brass.

Price of machine complete to make $1\frac{1}{4}$ and $1\frac{1}{2}$ -in. cupels.....\$25.00

Price of machine complete to make $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$ and 2-in. cupels.... 35.00

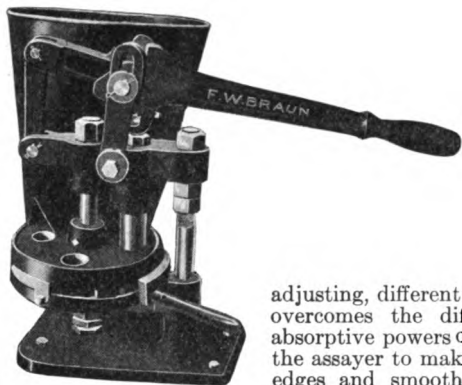
1608 Simplex Cupel Mold. Simple, effective, cheap. A self-contained impact implement for the rapid manufacture of first class cupels. No hammer or mallet required. Adjustable for making cupels of greater or less depth of bone ash. Made in two sizes: $1\frac{1}{4}$ inches and $1\frac{1}{2}$ inches diameter. Weight, $5\frac{3}{4}$ pounds. Net price..... 3.50

BRAUN CUPEL MACHINES

AUTOMATIC PATTERN

"A boy can make 600 cupels in an hour with the Automatic Machine."

No. 1610



No. 1610

A careful assayer is always a particular one, and considers a perfect cupel as necessary for an accurate assay as a good balance. Our cupel machines always produce perfect cupels; are simple in construction and easily operated. Hand driven cupels are never uniform either in size or compression, and a large percentage fissure or check in the muffle. The compressing power in our cupel machines is obtained by a series of levers which multiply the applied power about twenty times. The pressure is steady, and by adjusting, different degrees of compression are obtainable. This overcomes the difficulty found in making cupels of same absorptive powers of different grades of bone ash, and permits the assayer to make cupels of any density he desires. Perfect edges and smooth faces are obtained by expelling cupel downward.

These machines are manufactured in three different styles to suit various operators. Their convenience and efficiency make them a necessity in every assay office.

This machine consists of a hopper to hold the moistened bone ash, and a removable disc with a number of holes which are automatically filled and brought into position under the plunger. To operate, the bone ash is properly moistened and placed in the hopper in which is a small wheel with a rubber rim that keeps the material stirred up and fills the molds. Then raise the lever handle and grasping the handle on the lower disc bring the filled mold beneath the plunger. The downward motion of the lever handle compresses the cupel, and by pulling the disc handle in a reverse direction to that formerly given it, the opening in the lower disc is brought beneath the cupel, and further pressure on the lever handle brings a new system of levers into action expelling the cupel which may be caught in the hand. An automatic attachment stops the disc at the proper points, and an adjusting device is arranged for giving different degrees of compression.

Cupels of various sizes may be made by using interchangeable discs and dies, which are easily adjusted to the machine. Perfect edges and a homogeneous cupel are always obtained.

Greatest width, 17 in.; greatest length, 26 in.; greatest height, 17 in.

For Making	Net	WEIGHTS	Shipping	Price
1-inch cupels.....	75 lbs.		130 lbs.	\$37.50
1¼-inch cupels.....	75 lbs.		130 lbs.	37.50
1½-inch cupels.....	75 lbs.		130 lbs.	37.50
1¾-inch cupels.....	75 lbs.		130 lbs.	37.50
2-inch cupels.....	75 lbs.		130 lbs.	37.50
All five sizes.....	130 lbs.		190 lbs.	75.00

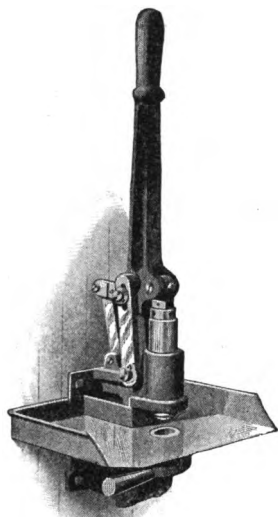
EXTRA DISCS AND DIES

For Making	Net	WEIGHTS	Shipping	Price
1-inch cupels.....	15 lbs.		25 lbs.	\$10.00
1¼-inch cupels.....	15 lbs.		25 lbs.	10.00
1½-inch cupels.....	15 lbs.		25 lbs.	10.00
1¾-inch cupels.....	15 lbs.		25 lbs.	10.00
2-inch cupels.....	15 lbs.		25 lbs.	10.00

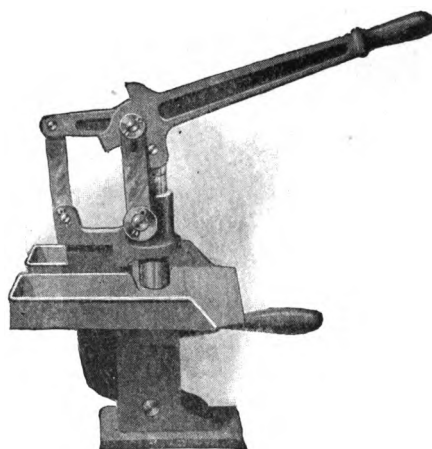
Prices net F. O. B. Denver, Salt Lake, El Paso or Los Angeles.

Agents for Braun Laboratory Appliances.

BRAUN CUPEL MACHINES



No. 1612
WALL PATTERN



No. 1614
TABLE PATTERN

WALL PATTERN

1612 For an assayer who does not care to use a variety of sizes of cupels or would not require a large number, the wall type is of special value. It is made to be bolted to a wall, post or other convenient support, and is operated in a manner similar to the table pattern. Capacity, 200 cupels an hour.

The wall cupel machines have no interchangeable parts, but are made in three sizes, $1\frac{1}{4}$ -inch, $1\frac{1}{2}$ -inch and $1\frac{3}{4}$ -inch, each requiring a separate and complete machine.

Greatest width, 16 in.

Greatest length, 23 in.

Greatest height, 15 in.

Net weight, 36 lbs.

Shipping weight, 60 lbs.

For making $1\frac{1}{4}$ -inch cupels..... \$15.00

For making $1\frac{1}{2}$ -inch cupels..... 15.00

For making $1\frac{3}{4}$ -inch cupels..... 15.00

TABLE PATTERN

1614 The workmanship on this machine is as fine as on the automatic type, and as perfect cupels may be produced. Capacity, 200 cupels an hour.

The degree of compression is regulated in the same manner as in the automatic type. This machine is made with interchangeable molds and dies, sizes, $1\frac{1}{4}$ -inch, $1\frac{1}{2}$ -inch, and $1\frac{3}{4}$ -inch. In ordering, please mention the size or sizes wanted.

Net weight of any one size, 48 lbs.

Shipping weight, 69 lbs.

Net weight all three sizes, 59 lbs.

Shipping weight, 90 lbs.

Extra mold and die, net weight, 7 lbs.

Shipping weight, 10 lbs.

Price complete, any one size..... \$20.00

Price, for making all three sizes of cupels..... 25.00

Extra mold and die:

Price.

For making $1\frac{1}{4}$ -inch cupels..... \$3.50

For making $1\frac{1}{2}$ -inch cupels..... 3.50

For making $1\frac{3}{4}$ -inch cupels..... 3.50

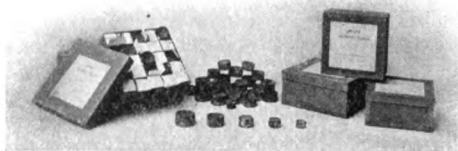
Prices net F. O. B. Denver, Salt Lake, El Paso or Los Angeles.

Agents for Braun Laboratory Appliances.

CUPELS, ETC.



No. 1616



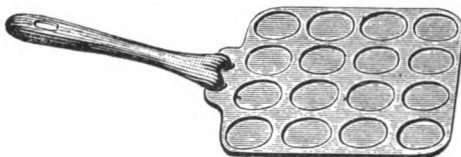
No. 1618

1616 Cupels. Our cupels are made from the best bone ash and have all the proper absorbing qualities.

Absorbing.....grammes	10	15	20	30	50	75	150
Diam. on top.....inches	1	1 1/8	1 1/4	1 1/2	1 3/4	2	2 1/2
Price.....per dozen	\$0.25	.30	.35	.40	.45	.60	.75
Price.....per 100	\$1.50	2.00	2.25	3.00	3.50	4.00	6.00

1618 "Brownite" Cupels. Not made of bone ash. They are made from a scientific compound carefully treated, they are of absolutely uniform composition and density. They are hard, do not crack and are guaranteed against breaking in shipment. For assay work with samples of ore, these cupels, made up for use, are far superior to the usual ones of bone ash. "Brownites" save large percentage of silver. Their use requires but one caution; should be hot before receiving the button.

No.	Diam. Inches	Height Inches	WEIGHT PACKED, LBS.		Price per 100
			(100)	(1000)	
1	1	5/8	5 1/2	65	\$1.00
2	1 1/4	3/4	7 3/4	90	1.25
3	1 1/2	7/8	10	120	1.75
4	1 3/4	1	15	175	2.00
5	2	1 1/8	22	240	2.50



No. 1620

1620 Cupel Trays. Holding 16 cupels, with detachable handle, all iron \$0.75

1622 Cups, Miner's. Of agateware.

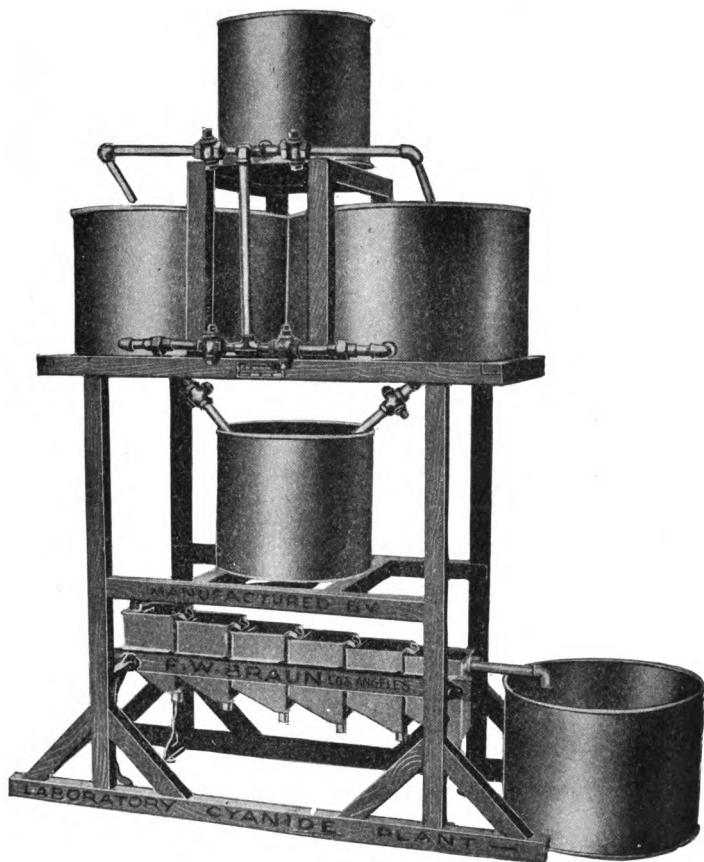
Capacity.....	pints	2	3
Price.....	each	\$0.50	.75

Cupel Rakes, Iron. See under Tongs, page 388, No. 3592.

Cupel Shovels, Iron. See under Tongs, page 388, No. 3594.

Cupel Tongs. See Tongs, page 387, Nos. 3582-3584.

BRAUN CYANIDE PLANTS



No. 1624

1624 Braun Cyanide Plant, Laboratory Size. Designed for making practical tests of from 100 to 200 pounds in accordance with modern practice. There are six zinc boxes arranged in series, it being possible to use any smaller number of units.

The solution from the cyanide solution tank may be fed to either one or both and to either top or bottom of ore tanks. Mounted on a substantial wood frame. Furnished complete, including filter bottoms for ore tanks.

Dimensions, when set up:

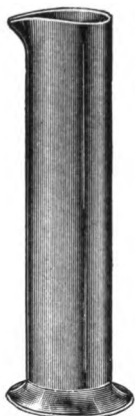
Total height.....	69 inches
Total width.....	24 inches
Total length.....	50 inches
Weight, net.....	130 lbs.
Weight, packed for shipment.....	180 lbs.
Price Complete.....	\$45.00

Prices net F. O. B. Denver, Salt Lake, El Paso or Los Angeles.

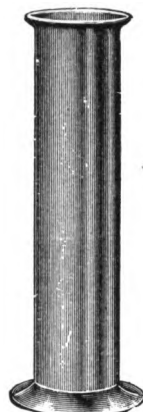
Cyanide Machinery, Hendryx. Catalogue and prices on application.

Agents for Braun Laboratory Appliances.

CYLINDERS



No. 1626



No. 1628

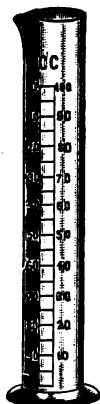
1626 Cylinders, Glass. With lip.

Height....inches	5	6	7	8	10	12	12	15	15	15	18	18
Diameter.inches	1	1¼	1¼	1½	1½	1½	2	1½	2	2½	2	3
Each.....	\$0.15	.20	.25	.30	.35	.40	.45	.50	.55	.70	.80	1.00

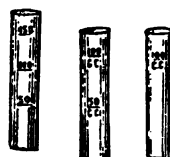
1628 Cylinders. With ring-neck, same dimensions and lists as above.



No. 1630



No. 1632



No. 1634

1630 Cylinders, Glass. With ground-in stopper, double graduation in cc., reading up and down.

Capacity cc.	10	25	50	100	200	250	300	500	1000	2000
Each.....	\$0.45	.60	.70	.80	1.00	1.20	1.30	1.65	2.40	4.00

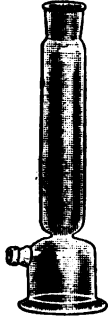
1632 Cylinders, Glass. With lip, double graduation in cc., reading up and down.

Capacity...cc.	10	25	50	100	200	250	300	500	1000	2000
Each.....	\$0.30	.40	.50	.60	.80	.90	1.00	1.20	2.20	3.50

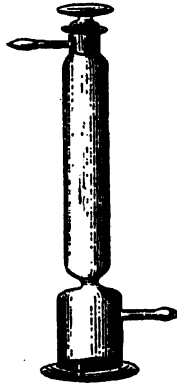
1634 Cylinders, Nessler's. For ammonia test, of clear colorless glass, with polished bottoms.

Capacity...cc.	50	100	50 and 100	50, 100 and 150
Each.....	\$0.50	.60	.75	1.00

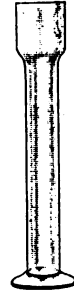
CYLINDERS AND DEMIJOHNS



No. 1636



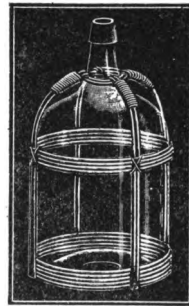
No. 1638



No. 1640

1636	Cylinders, Chloride Calcium. Plain.					
	Height.....in.	8	12	16	20	24
	Each.....	\$0.50	.75	1.20	1.75	4.00
1638	Cylinders, Drying. With perforated glass stopper.					
	Height.....in.				11	14
	Diam.....in.				1 $\frac{3}{4}$	2
	Each.....				\$1.75	2.25
1640	Cylinders, Hydrometer. With enlarged top.					
	Height.....in.	12	16	18	20	
	Each.....	\$0.40	.50	.60	.70	

DEMIJOHNS

Pear Shaped.
No. 1642Skeleton Demijohn.
No. 1644

Deflagrating Spoons. See under Combustion Spoons, page 127, No. 1432.						
1642	Demijohns, Wickered.					
	Capacity.....gals.	1	2	3	5	
	Each.....	\$0.50	.75	1.00	1.50	
The 5-gallon size is oval and has two handles.						
1644	Demijohns, "Skeleton." For laboratory work.					
	Capacity.....gals.	2	3	5		
	Each.....	\$1.00	1.25	1.75		

DESICCATORS



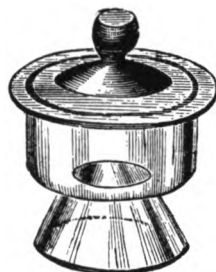
No. 1646



No. 1648



No. 1650



No. 1652

1646	Desiccators, Atwater's.	With triangle.....	each	\$1.75	
1648	Desiccators, Fresenius'.	Flat top.....	each	1.00	
1650	Desiccators, Fresenius'.	Round top, with brass triangle.....	each	1.25	
1652	Desiccators, Scheibler's.	With knob top, ground air tight.			
	Diameter.....	inches	4	5	6
	Each.....		\$0.60	.80	1.00
1654	Desiccators, Scheibler's.	Like No. 1652 above. With porcelain plate.			
	Diameter.....	inches	4	6	
	Each.....		\$1.40	2.00	



No. 1656



No. 1658



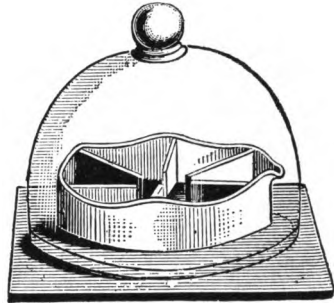
No. 1660

1656	Desiccators, Scheibler's.	With side tube and stopcock ground in.		
	Inside diameter, $5\frac{1}{2}$ inches.....	each	\$3.00	
1658	Desiccators, Fresenius'.	With stopcocks ground in, top tubulature.		
	Inside diameter, 5 inches.....	each	3.00	
1660	Desiccators, Hempel's.	Very perfect, from the fact that water vapor has a lower specific weight than air, and therefore accumulates in the upper part of the desiccator, which is overcome by placing the drying substance in the lower part of the cover.		
	Size.....	inches	4x4	6x5
	Each.....		\$3.50	4.50

DESICCATORS



No. 1662



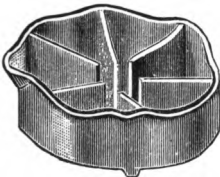
No. 1664

- 1662 Desiccator, Reinhardt's. This form possesses many advantages; the air-tight cover fits inside the rim and, therefore, cannot slip off. The drying material is placed in the upper broad rim, so that all the other space is available for drying purposes.

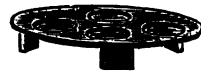
Drying space, 6x6 inches \$5.00

- 1664 Desiccator. Consisting of a porcelain acid dish and bell glass ground air-tight to heavy glass-plate.

Diameter of bell jar inches	6	8
Each.....	\$2.25	3.00



No. 1666



No. 1668

- 1666 Desiccator Dishes, or Acid Dishes. Of porcelain, with partitions.

Diameter.....inches	4¾	6½
Each.....	\$1.00	1.40

- 1668 Desiccator Plates. Of porcelain.

Diameter.....inches	3¾	5
Each.....	\$0.80	1.00

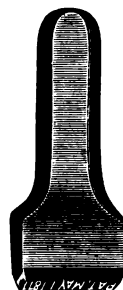
- 1670 Diamonds. For cutting glass; in handle \$5.00

- 1672 Diamonds. For writing on glass; in handle..... 3.00

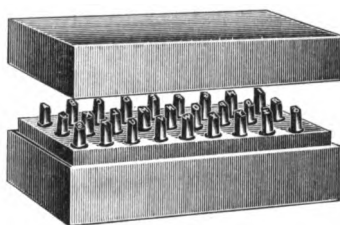
DIES



No. 1674



No. 1682



No. 1678

1674 Dies, Figures, of Steel, for Stamping Bullion, etc., Hand Cut, Best Quality.

Face, inches	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{7}{8}$	$\frac{1}{2}$
Set	\$0.60	.70	.80	1.00	1.20	1.60	2.40	3.00

1676 Dies, Figures, of Cast Iron, for Stamping Wood, Soft Metals, etc.

Size $\frac{1}{2}$ inch, per set	\$2.00
Size $\frac{3}{4}$ inch, per set	3.50

1678 Dies, Letters, of Steel, for Stamping Bullion, etc., Hand Cut, Best Quality.

Face, inches	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{7}{8}$	$\frac{1}{2}$
Set	\$1.75	2.00	2.50	3.00	3.50	5.00	6.50	8.50

1680 Dies, Letters, of Cast Iron, for Stamping Wood, Soft Metals, etc.

Size $\frac{1}{2}$ inch, per set	\$ 6.00
Size $\frac{3}{4}$ inch, per set	10.00

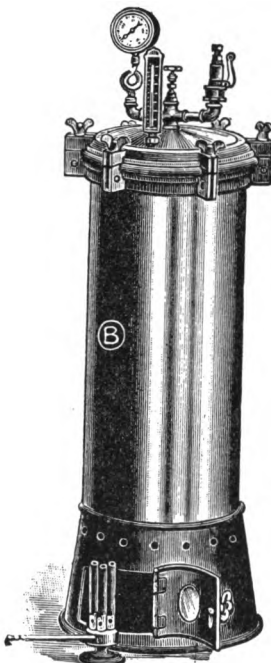
1682 Dies, Steel Stamps, i. e., Letters or Figures in one piece.

Size, inches	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$
Quoted upon Application.				

1684 Dippers, Agateware. Extra Strong, with Wooden Handles, for Quicksilver.

No. 210. Small size, $4\frac{1}{4} \times 3$ inch	each	\$0.60
No. 214. Large size, $6 \times 3\frac{1}{2}$ inch	each	.75

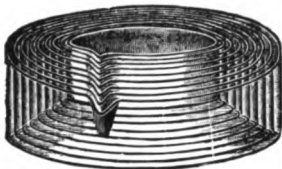
AUTOCLAV OR DIGESTER



Nos. 1686-1694

STERILIZATION UNDER STEAM PRESSURE

- 1686 Digester or Autoclav, for sterilizing under steam pressure. The boiler is made of extra heavy copper, tin-lined, is 24 inches deep and 11 inches in diameter, with a perforated rack inside. The lid is made of cast brass and nickel-plated. It is made with a ground joint no washers being necessary to make it steam-tight; it is held in position by six screw clamps. The apparatus is tested and guaranteed to stand pressure of 50 pounds to the square inch, is provided with a pressure gauge, thermometer and safety valve; the latter is set at 30 pounds, but may be increased or decreased. There is a small pet valve which must be kept open until the steam escapes, thereby forcing all the air out of the boiler. The base is made of sheet iron and is 8 inches high; extreme height of the apparatus is 40 inches.
- | | | |
|--|--|----------|
| Price | | \$ 50.00 |
| 1688 Large size. Inside dimensions, 14x26 inches, extreme height including base, 46 inches. | | |
| Complete with four-tube burner..... | | 50.00 |
| 1690 Large size. Same as above, but nickel-plated | | 110.00 |
| 1692 Medium size. Inside dimensions, 11x24 inches. Extreme height including base, 44 inches. | | |
| Complete with three-tube burner..... | | 75.00 |
| 1694 Medium size. Same as above, but nickel-plated..... | | 85.00 |



No. 1696



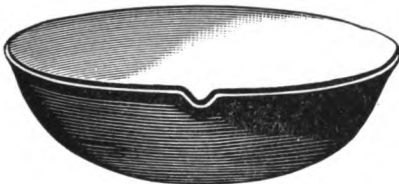
No. 1698

1696	Dishes, Crystallizing.	Glass, with flat bottom and straight sides.												
	Diameter	in.	2¼	2¾	3¼	3½	4	5	5½	6½	7½	8½	9½	
	Each		\$0.10	.15	.18	.19	.20	.30	.35	.45	.50	.60	.75	
1698	Dishes, Crystallizing.	Porcelain. Glazed inside, with flat bottoms, straight side and with lip.												
	Diameter	in.					6	8	10	11	12½			
	Each						\$0.60	.80	1.20	1.50	2.00			

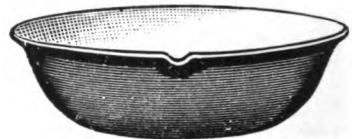


No. 1700

1700	Dishes, Evaporating.	Glass, hemispherical, with lip.							
	Diameter.....in.	2	2½	3¼	4	4¾	5¾	6½	
	Each.....	\$0.12	.15	.20	.25	.30	.40	.50	



No. 1702



No. 1704

1702	Dishes, Evaporating.	Royal Meissen Porcelain, with lip.											
	No.....	000	00	0	1	2	3	4					
	Diameter...in.	16	14½	13½	12	11	10	9					
	Capacity....	2¼ gal.	1¾ gal.	1¼ gal.	1 gal.	¾ gal.	½ gal.	2½ pts.					
	Each.....	\$6.50	5.50	4.00	3.00	2.00	1.75	1.40					
	No.....	5	6	7	8	9	10	11					
	Diameter...in.	7½	6½	5½	5	4½	3½	2½					
	Capacity....	2 pts.	1 pt.	½ pt.	6 oz.	4 oz.	2 oz.	1 oz.					
	Each.....	\$1.00	.80	.55	.40	.30	.20	.15					
1704	Dishes, Evaporating.	Royal Berlin Porcelain. Glazed inside and outside with lip.											
	No.....	000	00	0	1	2	3	4	5				
	Diameter.....in.	2¼	2¾	3	3¼	3½	3¾	4¼	4¾				
	Capacity.....oz.	1	2	3	4	5	6	8	10				
	Each.....	\$0.15	.18	.20	.30	.35	.40	.45	.55				
	No.....	6	7	8	9	10	11	12					
	Diameter.....in.	6	7	8¾	10½	12¼	14	16					
	Capacity.....qts.	½	1	1½	2½	3½	6	10					
	Each.....	\$0.70	.90	1.20	1.75	2.75	3.50	8.00					
	Dishes, Evaporation.	Silica Ware. See under Silica, page 360, Nos. 3236-3238.											

DISHES



No. 1706



No. 1708



No. 1710



No. 1714

1706	Dishes, Evaporating.	Royal Berlin porcelain.	With lip "shallow" form.							
No.	.....	1	2	3	4	5	6	7		
Diam.	.....in.	2¾	3¼	3½	4	4¾	5½	6		
Capacity	.....oz.	1	2	4	6	8	12	20		
Each	.....	\$0.25	.30	.40	.50	.60	.75	1.00		

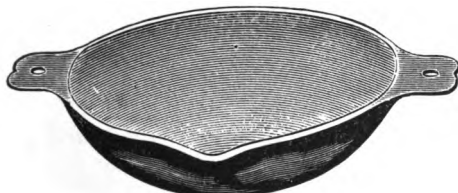
1708	Dishes, Evaporating.	German porcelain.	Glazed inside with heavy rim.							
No.	.....	00	0	1	2	3	4	5	6	7
Diam.	.....in.	16	14	12	11	10	9	8	7	6½
Capacity	.....oz.	384	256	128	96	64	48	32	24	20
Each	.....	\$4.00	3.00	1.80	1.50	1.30	.90	.80	.70	.60

1710	Dishes, Evaporating.	German porcelain.	Glazed inside with light rim, shallow.							
No.	.....	00000	0000	000	00	0				
Diam.	.....in.	2	2½	3	3½	4¼	5½			
Capacity	.....oz.	¾	1¼	2	3	4	8			
Each	.....	\$0.10	.12	.15	.18	.20	.25			

1712 Dishes, Evaporating. Royal Berlin shape; but of Thuringian make; a good dish for regular laboratory work. Glazed inside and out.

No.	.....	00	0	1	2	3	4	5		
Capacity	.....oz.	1	1½	2	3	4	6	8		
Diam.	.....in.	2¾	3	3¼	3½	4	4¼	4½		
Each	.....	\$0.10	.12	.15	.18	.20	.30	.35		

1714 Dishes, (Basins). Of electroquartz, not transparent. See under Silica, page 360, Nos. 3236-3238.



No. 1716



No. 1718

1716	Dishes, Evaporating.	Agateware.								
No.	.....	1	2	3	4	5	6	7	8	9
Capacity	.....gal.	⅛	¼	½	1	2	3	4	5	6
Each	.....	\$0.90	1.15	1.50	2.10	3.00	4.20	5.70	9.30	11.70

1718	Dishes, Lead.	Shallow form.								
Diam.	.....in.	2	2½	3	4	5	6			
Each	.....	\$0.12	.15	.20	.25	.35	.45			

DISHES



No. 1724

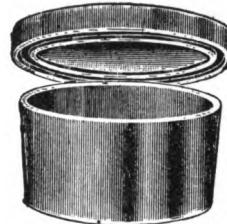


No. 1726

- 1720 Dishes. Pure solid nickel with lip.
 Diam.....mm. 40 60 80 100 150
 Each..... \$0.45 .65 1.00 1.40 2.40
- 1722 Dishes. Platinum. See Platinum, page 333, No. 2966.
- 1722 Dishes. Pure silver. Any size made to order. Prices on application.
- 1724 Dishes. German silver. Large, with lip and counterpoise for weighing sugar samples, each..... \$2.00
- 1726 Dishes. s. c. Moist Chambers. With cover; diameter, 9 inches inside, height 2½ inches, each..... \$1.50



No. 1728



No. 1730

- 1728 Dishes, Petri's Culture. A double dish, very flat, loosely fitting cover, diameter, 4 inches, each..... \$0.30
- 1730 Dishes, Preparation. These jars have no contraction at the top; the cover being grooved and ground makes them air-tight.
- | Size..... | A | B | C | D |
|----------------|--------|------|------|------|
| Height.....in. | 3½ | 1½ | 1 | ¾ |
| Diam.....in. | 2¾ | 2¾ | 2 | 1¾ |
| Dozen..... | \$2.00 | 1.80 | 1.50 | 1.20 |
| Each..... | .20 | .18 | .15 | .12 |



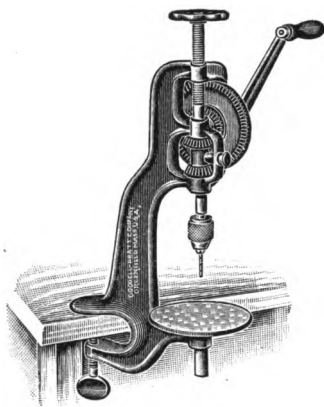
No. 1732



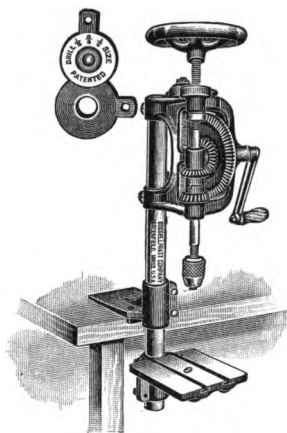
No. 1734

- 1732 Dishes, Staining. Watch glass form, beveled edge and flat bottom, with groove to allow setting upon top of each other, with ground mark on edge for writing on surface. Per doz..... \$1.00
- 1734 Dishes, Aluminum. Flat bottom, straight sides for milk analysis and moisture determination.
- | Diam.....in. | 2 | 2½ | 3 |
|----------------|--------|-----|-----|
| Height.....in. | ½ | ¾ | 7/8 |
| Each..... | \$0.30 | .35 | .40 |

DRILLS

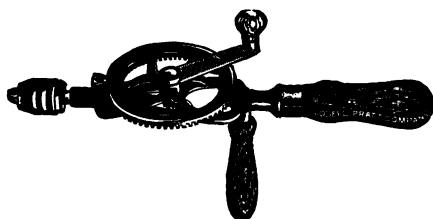


No. 1736

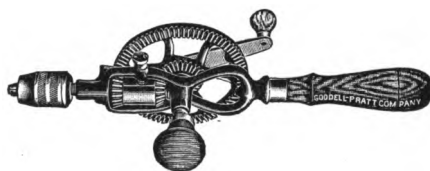


No. 1738

- 1736 Drill, Sampling. For drilling small samples of metals from bullion.
For assaying..... \$10.00
- 1738 Drill with Automatic Feed and Special Vise. The vise engages with the grooves in the table, which prevents its turning when the work is being drilled..... 25.00



No. 1740

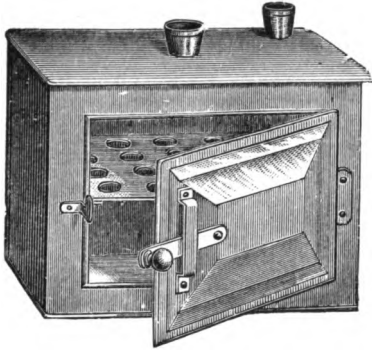


No. 1742

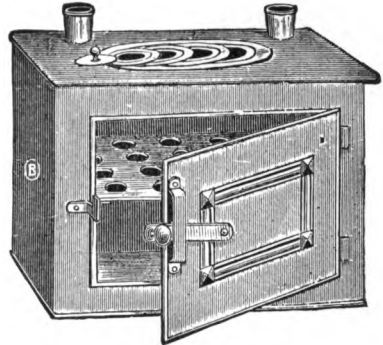
- 1740 Drill, Sampling. Has handle of polished hardwood. Extra side handle—polished hardwood; can be removed at will. Malleable iron frame, well japanned. Cut teeth gears, nickel-plated. Both gears are held together by a steel guard, having every advantage of a double geared drill.... \$2.50
- 1742 Drill, Sampling. Embraces features never before used upon tools of this character, and is well guaranteed by the manufacturer. It has double gears, two speeds, and a chuck, capacity to $\frac{3}{8}$ inch. Polished cocobolo handle, screw cap..... 3.50

No drill points are furnished with above drills.

DRYING OVENS



No. 1744



No. 1748

1744 Double Wall. For water, of heavy polished copper, tubulature for thermometer, ventilator, etc, adjustable shelf.

Size.....inches	6x8	8x10	10x12
Without support.....each	\$7.00	9.00	13.00
With support.....each	\$8.00	10.00	14.00

1746 Supports. Of iron. With set screws holding oven in position.

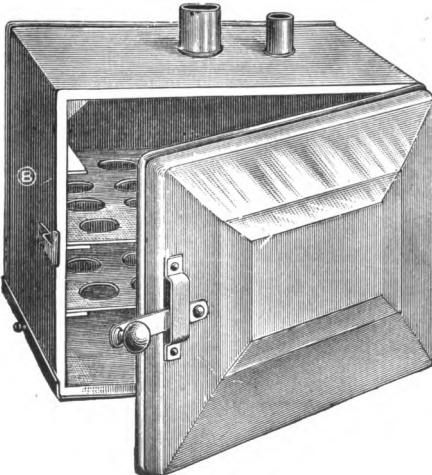
Size.....inches	6x8	8x10	10x12
Each.....	\$1.00	1.00	1.00

1748 Double Wall. Of copper. With extra water bath on top, opening for thermometer, movable shelf and extra sheet iron bottom.

Size.....inches	6x8	8x10	10x12
Each.....	\$8.00	10.00	15.00

1750 Same on four legs.

Each.....	\$9.00	11.00	16.00
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No. 1752

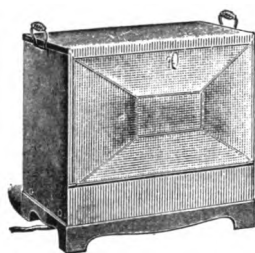
1752 Single Wall. Made of heavy polished copper, with tubulations for thermometer and gas regulator, extra sheet iron bottom, and supported on iron stand with set screw by which the oven is held firmly. The 6x8 and 8x10-inch sizes have one removable shelf; and the 10x12-inch size has two removable shelves. The 10x12-inch size is shown in the illustration.

Size.....inches	6x8	8x10	10x12
Without support.....each	\$4.00	6.00	8.00
With support....each	\$5.00	7.00	9.00

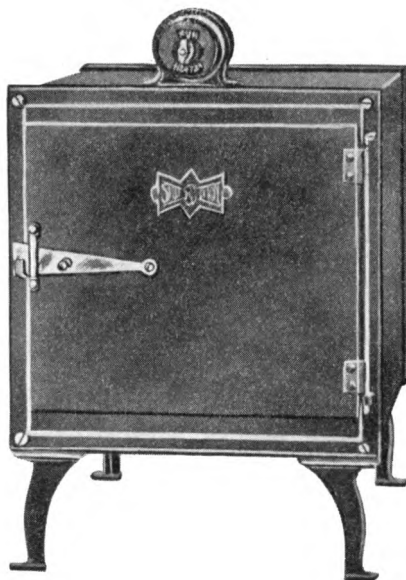
ELECTRIC DRYING OVENS



No. 1754



No. 1756



No. 1760

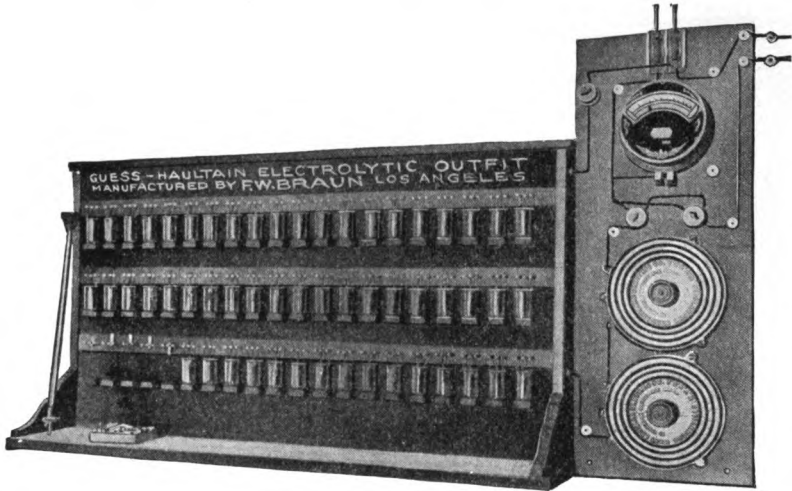
The double walls are packed with asbestos to conserve the heat, and when the door is closed it becomes an air-tight box. Within, at the top and the bottom of the oven, are the two heating plates. As soon as the current is turned on, these at once become hot throughout their whole area and give a steady, measured heat to every part of the oven, a heat that comes from above as well as below; a heat that is the same every time with the same position of the switch, and the effect can be measured by the clock.

The electric oven can be placed where it is most convenient to reach without stooping. In use it will not affect the temperature of the room.

		Watts	Price Each
1754	Inside dimensions, 12 in. wide, 12 in. deep, 14 in. high. Weighs 30 pounds. Three heats, four feet cord and plug switch	1100	\$20.00
1756	Inside dimensions, 19 in. wide, 12 in. deep, 13 in. high. Weighs 60 pounds. Three heats, four feet cord and plug switch	1600	25.00
1758	Inside dimensions, 15 in. wide, 12 in. deep, 11½ in. high. Weighs 60 pounds. Three heats, four feet cord and indicating snap switch on front	1300	35.00
1760	Inside dimensions, 15 in. wide, 18 in. deep, 11½ in. high. Weighs 75 pounds. Three heats, four feet cord and indicating snap switch on front	1600	40.00
1762	Inside dimensions, 15 in. wide, 18 in. deep, 11½ in. high. Weighs 76 pounds. Same style as above with thermometer. Three heats, four feet cord and indicating snap switch on front	1600	45.00
1764	Inside dimensions, 21½ in. wide, 19 in. deep, 13 in. high. Weighs 115 pounds. Three heats, four feet cord and indicating snap switch on front	2400	60.00

Drying Pans. See under Pans, page 326, Nos. 2908-2910.

ELECTROLYTIC APPARATUS



No. 1766

GUESS-HAULTAIN ELECTROLYTIC APPARATUS

1766 The increasing demand for greater speed and more accuracy in making a large number of assays daily has caused the development of electrolytic apparatus for use in determining lead and copper. The Guess-Haultain apparatus can be supplied in small sets or sets of many units without the prohibitive investment for heavy platinum electrodes. The corrugated form of electrodes permits of minimum weight and maximum surface and furnishes the necessary strength and rigidity.

The anodes may be either stationary or rotating. If the latter equipment is desired, each one is supplied with its individual motor, so that any one or all may be rotated at pleasure. The manner of attaching the electrodes to their respective circuits is quick and convenient. The current may be either alternating, using a rectifier, or direct or by direct current from a battery.

Prices upon application, being somewhat dependent on market price of platinum. In writing for information state the number of units desired and whether for battery or power current; if for power current, state voltage, direct or alternating, giving cycle and phase.

We are prepared to furnish special equipment to educational institutions where it is desired to have two-unit individual cabinets for the use of the students, or a larger number of units in cabinets, each fitted with special devices so that the current is easily controlled, and insuring accurate results.

Outfits of any number of units can be supplied.

ROTATING ANODES

To facilitate the deposition of the metal, a rotating anode has been found most efficient, reducing the time to a minimum. Our form of installing rotating anodes is different from those generally in use, as we supply a separate little motor for each electrode, so that one or more can be run at a time, which makes a more satisfactory electrolytic outfit than where the entire row of electrodes have to revolve when one is in operation.

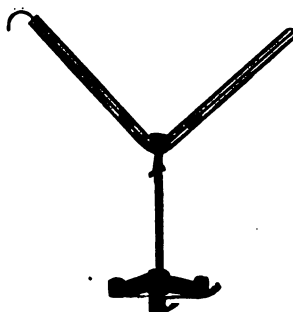
Price of these motors, each.....\$1.00

Motor generator sets for operating electrolytic outfits. See page 314.

ELECTROLYTIC APPARATUS

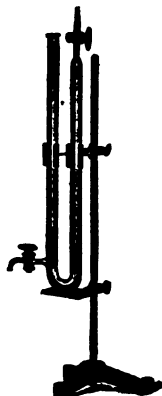


No. 1768

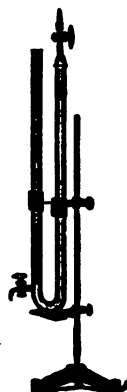


No. 1770

- 1768 Hoffman's Apparatus. For electrolysis of water, gases collected in separate graduated tubes \$1.50
- 1770 Hoffman's Apparatus. For electrolytic decomposition of water, hydrochloric acid and ammonia..... 4.50
- Glass part only 3.00



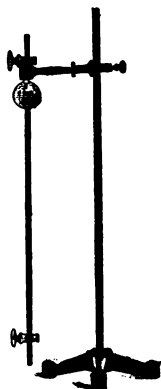
No. 1772



No. 1774

- 1772 Hoffman's Apparatus. For determining the volume of hydrogen in hydrochloric acid..... 6.00
- Glass part only 3.50
- 1774 Hoffman's Apparatus. For demonstrating that three volumes of hydrogen united with one volume of nitrogen form two volumes of ammonia .. 7.00
- Glass part only 4.50

ELECTROLYTIC APPARATUS

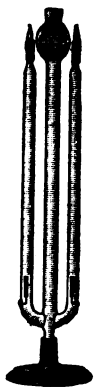


No. 1776



No. 1778

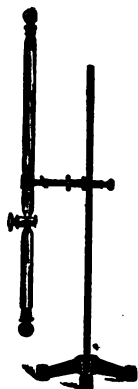
- 1776 Hoffman's Apparatus. For demonstrating that one volume of H. unites with one volume of CL. to form two volumes of HCL. without alteration in volume. each \$4.25
 Glass part only for same each 2.75
- 1778 Hoffman's Apparatus. For decomposition of water, demonstrating that water is composed of two volumes hydrogen and one volume oxygen. each 8.50
 Glass part only for same each 5.50
- 1780 Same as above, with graduated tubes, mounted. each 10.00
 Glass part only for same each 7.00



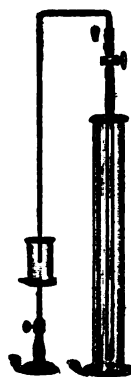
No. 1782

- 1782 Hoffman's Apparatus. For decomposition of water on wooden support, 18 inches high. each 4.50
- 1784 Hoffman's Apparatus. To demonstrate that hydrogen combines with oxygen only in the proportions in which it is liberated from water by electrolysis. Tubes with two stopcocks each 4.00
 Tubes with one stopcock each 3.00
 Supports. each 2.50

ELECTROLYTIC APPARATUS



No. 1786



No. 1788

- 1786 Hoffman's Apparatus. To prove the invariability of combination by volume between hydrogen and chlorine in hydrochloric acid.
- | | |
|-------------------|--------|
| Complete | \$4.00 |
| Tubes, only | 2.50 |
- 1788 Hoffman's Apparatus. To prove that ammonia consists of one part nitrogen and three parts hydrogen. Complete on support..... 9.00



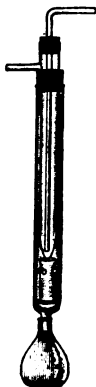
No. 1790



No. 1792

- 1790 Hoffman's Apparatus. For decomposing of water, hydrochloric acid and ammonia. Tubes with platinum electrodes..... \$6.00
- | | |
|------------------------------------|------|
| Tubes with carbon electrodes | 6.00 |
| Supports..... | 3.00 |
- 1792 Hoffman's Apparatus. Eudiometer, for lecture table use. Complete with support..... 9.00
- | | |
|------------------------|------|
| Glass part, only | 6.00 |
|------------------------|------|
- 1794 Emery Cloth. Per Sheet..... .08
- 1796 Emery Paper. Per Sheet..... .05
- Envelopes. See Paper, page 327, No. 2920.

EXTRACTION APPARATUS



No. 1798



No. 1800

1798	Extraction Apparatus—Krussler's, with condenser, and three flasks ground on. Price.....	\$3.50
1800	Extraction Apparatus—Knorr's, with ether tight mercury joints, dispensing with corks and ground joints, complete.....	6.00
	Extra Condenser with Adapter sealed on	3.60
	Extra Extraction Tubes with Platinum Sieve	2.00
	Extra Flasks .....	.40



No. 1802



No. 1806

1802	Extraction Apparatus—Mohr's, with flask and condenser.....	\$3.00
	Tube only	1.25
1804	Extraction Apparatus—Soxhlet's, specially adapted for the extraction of fat in milk analysis, etc. (extraction tube only).	
	Capacity .....cc.	60 125 200
	For S. S. Shells .....mm.	22 x 80 33 x 80 43 x 123
	Price .....each	\$1.35 1.60 2.50
1806	Apparatus—Soxhlet's, complete with flask and condenser.	
	Capacity .....cc.	60 125 200
	Price .....each	\$3.00 3.60 4.50

EXTRACTION APPARATUS



No. 1808



No. 1812



No. 1814



No. 1816

1808 **Extraction Apparatus, Soxhlet's.** All joints ground air tight, complete with three flasks and condenser.

Capacity.....cc.	60	125
Price.....each	\$4.50	5.50

1810 **Extraction Apparatus, Soxhlet's.** Complete with nickel-plated brass ball condenser and flask.

Capacity.....cc.	60	125	175
Price.....each	\$4.50	5.00	5.75

1812 **Extraction Apparatus, Soxhlet's.** Modified, with ground-in Hopkins condenser and Knorr's flasks for mercury seal. An ideal comb. For ether tight joints.

Capacity.....cc.	60	125
For S. & S. shells.....mm.	22x80	33x80
Price.....each	\$4.75	5.50

1814 **Extraction Apparatus, Thorn's** \$2.00

1816 **Extraction Shells, of Schleicher and Schuell's fat free paper, for use in Soxhlet's and ether extraction apparatus.** The use of these shells renders it impossible for any of the material to find its way into the solvent, and can be used over and over again. Put up in boxes of 25.

Length.....mm.	60	80	80	90	94	123
Diameter.....mm.	26	22	33	19	33	43
Price, per box of 25....	\$1.45	1.45	1.60	1.45	1.95	3.15

FILES

1818 **Files, Round.** With fine points, best double cut.

Length.....inches	4	5	6	8
Price.....each	\$0.10	.12	.15	.20

1820 **Files, Triangular.** For cutting glass tubing, best double cut.

Length.....inches	3	4	5	6	8
Price.....each	\$0.08	.10	.12	.15	.20

1822 **Files, Flat.** Best double cut.

Length.....inches	3	4	5	6	8
Price.....each	\$0.12	.15	.18	.20	.25

1824 **File Handles** per dozen \$0.50

FILTER PAPER



Nos. 1826-1828

1826 Filters, Standard Gray. Cut in circles.

Diameter. .in.	4	5	6	7	8	10	13	15	18	20	24
Per 100.....	\$0.11	.14	.18	.24	.28	.40	.60	.76	1.10	1.40	1.80

1828 Filters, White. Cut in circles.

Diam..in.	3	4	5	6	7	8	10	13	15	18	20	24
Per 100..	\$0.10	.12	.15	.20	.26	.33	.46	.70	.86	1.20	1.50	2.00

In sheets, 19x19 inches (48x48 cm.)

	GRAY		WHITE
Per quire	\$0.38	Per quire	\$0.40
Per ream.....	6.15	Per ream.....	6.80

1830 Filters, Prat-Dumas & Co., French. Round cut, white.

No.....	7	10	13	15	19	25	33	40	45	50
Dia....in.	3	4	5	6	8	10	13	15	18	20
Per 100..	\$0.10	.18	.20	.25	.30	.40	.60	.80	1.00	1.20

In sheets, size 21x17 in.....ream, \$5.00; quire..... \$0.30

1832 Filters, Prat-Dumas & Co., French. Round cut, gray.

No.....	15	19	25	33	40	45	50
Dia..... in.	6	8	10	13	15	18	20
Per 100....	\$0.20	.25	.30	.50	.70	.90	1.10

In sheets, size 21x17 in.....ream, \$4.00; quire..... .25

1834 Filters, Baker & Adamson's. Washed in hydrochloric and hydrofluoric acid, giving the lowest ash of any filter paper on the market. Put up in boxes holding 100 round filters. "Double Washed." "A" grade is thin; "B", thick.

Dia.....cm.	5½	7	9	11	12½	15
Ashes, 1 filter grm	.00001	.00002	.00003	.00005	.000065	.000093
Per 100.....	\$0.40	.50	.65	.80	1.00	1.20

1836 Filters, Baker & Adamson's. Washed in hydrochloric acid only. "Single Washed."

Dia.... cm.	5½	7	9	11	12½	15
Per 100....	\$0.15	.30	.45	.55	.60	.85

FILTER PAPER



No. 1840



Nos. 1844-1850

SCHLEICHER & SCHUELL'S FILTER PAPERS

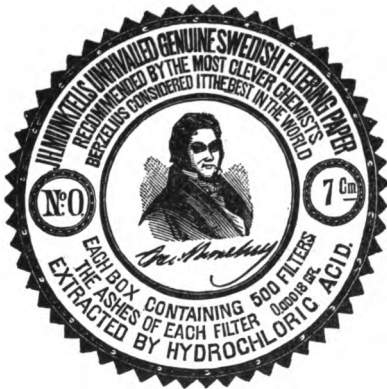
- 1838 S. & S. No. 595. A good, light paper, free of chlorine, grained surface, round.
 Diam.....ctm. 5.5 7 9 11 12.5 15 18.5 24 32
 Per 100, net..... \$0.09 .10 .14 .16 .18 .26 .31 .60 1.00
 In sheets, 47x54 ctm., 19x21 inches, smooth surface.
 Per 1,000, net..... \$18.60
 Per 100, net..... 2.15
- 1840 S. & S. No. 597. A heavy paper, perfectly white and quick filtering, round.
 Diam.....ctm. 5.5 7 9 11 12.5 15 18.5 24 32
 Per 100.....net \$0.13 .14 .20 .25 .26 .35 .46 .70 1.15
 In sheets, 58x58 ctm., 23x23 inches.
 Per 1,000, net..... \$35.40
 Per 100, net..... 4.00
- 1842 S. & S. No. 575. Hardened filters, especially adapted to use with filter pump, as they cling closely to the sides of the funnels. Also suitable for filtration of caustic liquids.
 Diam.....ctm. 5.5 7 9 11 12.5 15
 Per 100, net..... \$0.50 .55 .80 .95 1.05 1.25
- 1844 S. & S. No. 589. "White Ribbon." Washed with hydrochloric and hydrofluoric acids. This we send as No. 589, when not otherwise ordered.
 Diam.....ctm. 5.5 7 9 11 12.5 15
 Per 100, net..... \$0.47 .50 .73 .88 .98 1.15
- 1846 S. & S. No. 589. "Black Ribbon." Prepared especially for use in laboratories for metallurgy.
 Diam.....ctm. 5.5 7 9 11 12.5 15
 Per 100, net..... \$0.47 .50 .73 .88 .98 1.15
- 1848 S. & S. No. 589. "Blue Ribbon." Made of close, firm material and suitable for retaining the finest precipitates which pass the black or white ribbon paper. They do not work rapidly and we suggest their use with a filter pump or as folded filters.
 Diam.....ctm. 5.5 7 9 11 12.5 15
 Per 100, net..... \$0.47 .50 .73 .88 .98 1.15
- 1850 S. & S. No. 589. "Yellow Ribbon." Washed with hydrochloric and hydrofluoric acids. These filters have the same properties as the "White Ribbon," but besides being freed from mineral constituents are washed with ether.
 Diam.....ctm. 5.5 7 9 11 12.5 15
 Per 100, net..... \$0.60 .65 .95 1.15 1.25 1.55

Continued on next page

FILTER PAPER

SCHLEICHER & SCHUELL'S FILTER PAPERS

1852 S. & S. No. 590. Washed with hydrochloric and hydrofluoric acids, in which the washing has been carried to the utmost limit, round.							
Diameter.....	ctm.	5.5	7	9	11	12.5	15
Per 100, net.....		\$0.60	.65	.95	1.15	1.25	1.55
1854 S. & S. No. 588, Folded Filters. In boxes of 100 each.							
Diameter.....	ctm.	12.5	18.5	24	32		
Per 100, net.....		\$0.30	.46	.65	1.05		



Nos. 1856-1862

MUNKTELL'S SWEDISH FILTER PAPERS

Weights of Ashes from Munktell's Swedish Cut Round Filters

Size No.	5.5 CTM. Gram.	7 CTM. Gram.	9 CTM. Gram.	11 CTM. Gram.	12.5 CTM. Gram.	15 CTM. Gram.
0	0.000060	0.00010	0.00017	0.00025	0.00033	0.00046
1F	0.00014	0.00023	0.00038	0.00056	0.00073	0.00115
2	0.00018	0.00030	0.00051	0.00074	0.00095	0.00138

- 1856 No. 0 Washed Filters. Washed with hydrochloric acid, removing traces of iron, alumina, lime, etc. The ash is reduced to a minimum and a high standard of purity is secured. A uniform and quick filter, retaining fine precipitates; adapted to the most precise requirements of analytical work. In square sheets, 48x48 ctm., per quire..... \$2.50

Cut in round filters, 100 in a package, five packages in a box of birch bark.

Diameter.....	ctm.	5.5	7	9	11	12.5	15	18.5
Per 100, net.....		\$0.20	.27	.42	.55	.63	.85	1.25

- 1858 No. 1F, the Original Swedish Paper. Of best linen material, most perfect filtering paper made; leaves one-third less ash than formerly, the smallest amount of any unwashed paper. Very strong, adapted to the highest class of chemical work. The finest precipitates are retained.

Per ream of 480 sheets; size, 48 x 48 ctm..... \$20.00

Per quire..... 1.20

Cut in round filters, 100 filters in a package, five packages in a box of birch bark.

Diameter.....	ctm.	5.5	7	9	11	12.5	15	18.5
Per 100, net.....		\$0.11	.16	.25	.30	.40	.50	.75

Continued on next page.

FILTER PAPER AND FILTERS

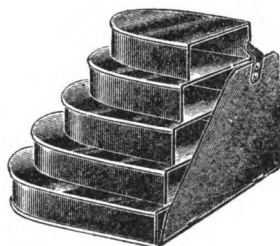
FILTER PAPER

1860	No. 2.	A pure white linen paper of medium thickness, not as closely made, therefore more rapid in filtration. A superior paper for all laboratory work.									
		Per ream of 480 sheets; size 48x48 ctm.									
		Per quire 1.00									
		The same in round filters, 100 filters in a package, five packages in a box of birch bark.									
		Diameter	ctm.	5.5	7	9	11	12.5	15	18.5	
		Per 100 filters		\$0.10	.13	.20	.26	.31	.40	.53	
1862	No. 3.	A pure white paper of superior quality, heavier than No. 2. Filters rapidly. Fully equal to any of the best German papers, but at less cost than any other paper of the same quality and weight.									
		Per ream of 480 sheets; size, 48x48 ctm.									
		Per quire ..... .80									
		Also in round filters, 100 filters in a package.									
		Diameter	ctm.	5.5	7	9	11	12.5	15	18.5	
		Per 100 filters		\$0.08	.10	.15	.18	.24	.32	.41	

FILTERS



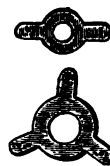
No. 1864



No. 1866



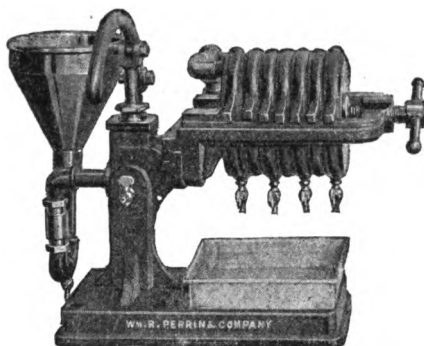
No. 1868



No. 1870

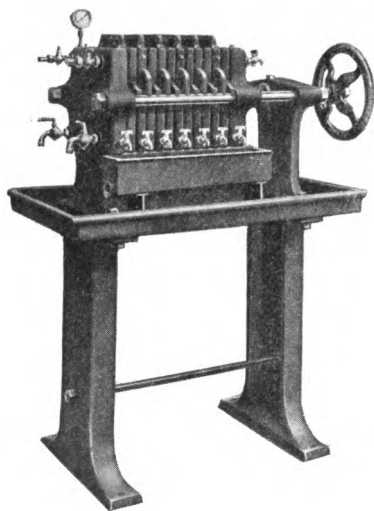
1864	Filter Bags.	Best white, S. C. "Felt Filters."									
	No.	1	2	3	4	5	6	7	8	9	10
	Diameter	in.	7	8	9	11	13	14	16	18	20
	Capacity	gals.	1/4	1/2	3/4	1	1 1/4	1 2/3	2	3	4
	Each		\$0.50	.60	.70	1.00	1.25	1.50	1.75	2.00	2.50
											3.50
1866	Filter Case.	Of tin, to protect round filters from dust. For 6 sizes, 5 1/2 to 15 ctm. diameter. each									
											\$3.00
1868	Filter Plates.	Porcelain, with small holes.									
	Diameter	ctm.	2	4	5	6	8	10			
	Each		\$0.15	.20	.25	.30	.45	.60			
1870	Filter Rings.	Of porcelain, as supports for funnels over beakers, etc.									
	2 arms, 25 cents; 3 arms.										each
											\$0.35

FILTER PRESSES



No. 1872

1872 Filter Press. Experimental, round pattern. For laboratory use, built to stand a pressure of 150 pounds to the square inch. Made with flat plates and frames, so that filter cloth or paper can be used; of iron, with brass valves fitted to pump; weight, about 125 pounds. Net, each..... **\$60.00**



No. 1874



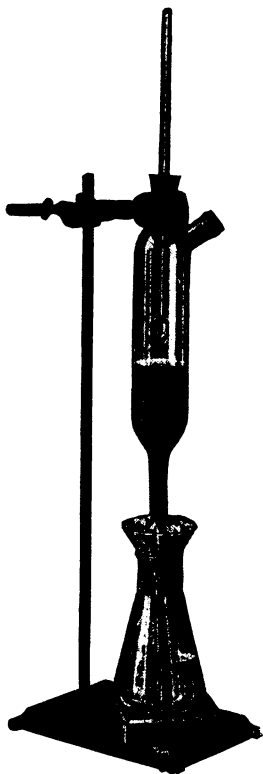
No. 1876

1874 This Laboratory Filter Press is a complete working model of the highest type of filter press. Each plate represents one square foot of filtering area and the chamber has a capacity of one twenty-fourth of a cubic foot. There are six chambers, so that the exposed filtering area is six square feet with a capacity for solids of one quarter cubic foot. It is arranged so that the filtered material may be discharged through internal ports without exposure to air or discharged into an open trough, and it is equipped with ports for absolute washing or extraction. There is supplied with the press, when desired, a specially constructed Montejus for feeding the press, which is much more convenient where compressed air is available.

1874 Filter Press. Each..... **\$100.00**
1876 Montejus. Each..... **30.00**

FILTERING APPARATUS AND PUMPS

FILTERING APPARATUS, FITZGERALD'S CONSTANT LEVEL



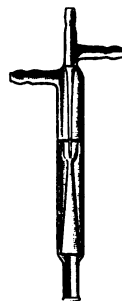
No. 1878

1878 The apparatus works the same as inverting a flask containing the liquid to be filtered over a funnel with its filter paper, having the opening of the flask a little below the edge of the paper, but does the work more conveniently and accurately. When wanted for use it is set up as illustrated, with the lower opening about three-sixteenths of an inch below the edge of the paper. The glass rod is pushed down until the ground stopper closes the opening. The rubber stopper is then removed from the side opening and the liquid to be filtered is poured in. The glass rod is then gently raised till enough liquid has entered the funnel to close the lower opening. At this point the stopper is replaced in the side opening and rod raised an inch or two. The level of the liquid in the funnel starts to recede at once, exposing the lower opening, allowing air to enter at this point, with the consequent replenishing of the liquid to the funnel. After a filtration is made the precipitate may be washed in like manner with distilled water.

A great variety of work can be done by this useful little device and it is especially valuable when, as frequently happens, the chemist has no time to complete a filtration by hand before leaving for home at night and can put the liquid in the apparatus before leaving the laboratory and find it filtered next morning.
Price.....net \$2.50



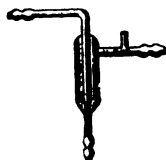
No. 1880



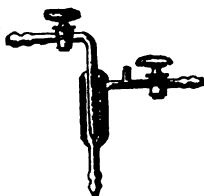
No. 1882

1880	Filtering Pumps, Muencke's	\$1.20
1882	Filtering Pumps, same with Double Suction	1.30

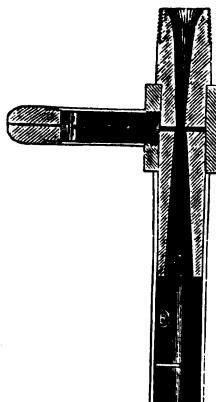
FILTERING PUMPS



No. 1888



No. 1890



No. 1892



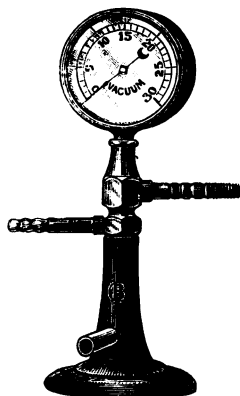
No. 1894



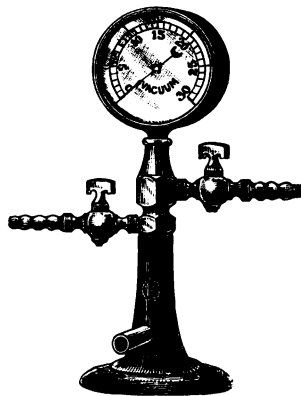
No. 1896

Nos. 1884-1886

1884	Filtering Pumps, Richard's. Brass, of superior make.....	\$2.00
1886	Filtering Pumps. Same as above, extra large.....	7.00
1888	Filtering Pumps, Fischer's. Glass, plain.....	1.00
1890	Filtering Pumps. Same as above, with 2 stopcocks	3.00
1892	Filtering Pumps, Chapman's. All brass.	
	Small size 3 $\frac{1}{4}$ inches.....	1.40
	Large size 4 $\frac{3}{4}$ inches.....	1.80
1894	Filtering Pump Couplings, Chapman's.	
	Small.....	.30
	Large.....	.40
1896	Filtering Pump Connections, Royle. To connect to smooth faucet .....	.50



No. 1898



No. 1900

1898	Filtering Pumps. On base, with vacuum gauge.....	9.00
1900	Filtering Pumps. With vacuum gauge, and stopcocks at water and exhaust connections.....	10.00
1902	Filtering Pumps. Same as above, without gauge.....	6.50
1904	Filtering Pumps, Boekel's.	
	Small size, 3 $\frac{3}{4}$ -inch, $\frac{1}{8}$ -inch I. P. thread	1.50
	Med. size, 4 $\frac{3}{4}$ -inch, $\frac{1}{4}$ -inch I. P. thread	1.75
	Large size, 5 $\frac{3}{8}$ -inch, $\frac{1}{4}$ -inch, I. P. thread	2.00
	Finger Cots. See Rubber, page 350, No. 3132.	

FIRE BRICK AND TILE

The Fire Brick and Tile which we supply are of the very highest grade clay and the most careful manufacture.

The Brick are made by the "stiff mud" process, and will stand abrasion well. They are straight and true, and will lay up with close joints.

Particular attention is paid to the texture of the different products, so that they will meet the requirements of metallurgical operations, and they will stand extreme temperatures.

We solicit the opportunity of quoting upon SPECIAL TILE, and are prepared to execute orders for the most complicated designs in a prompt and satisfactory manner, making them of the material best suited for the particular requirements of the case.

FIRE BRICK

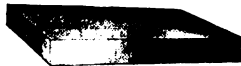
STANDARD 9-INCH AND 9-INCH SHAPES

9-INCH STRAIGHT



No. 1906

SPLIT



No. 1908

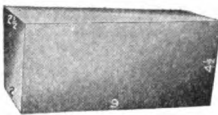
SOAP



No. 1910

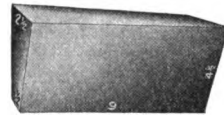
Style	Dimensions, Inches
Standard.....	4½ x 2½ x 9
Split.....	4½ x 1¼ x 9
Soap.....	2½ x 2¼ x 9

No. 1 ARCH



No. 1912

No. 2 ARCH



No. 1914

Number	Style	Dimensions, Inches	Inside Diam., Inches	Brick to Circle
1	Arch	4½ x 9 Taper 2½ to 2	27	45
2	Arch	4½ x 9 Taper 2½ to 1½	12	25
3	Arch	4½ x 9 Taper 2½ to 2¼	80	111
4	Arch	4½ x 9 Taper 2½ to 1¾	21	36

No. 1 BULLHEAD



No. 1916

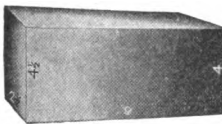
No. 2 BULLHEAD



No. 1918

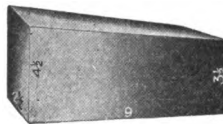
Number	Style	Dimensions, Inches	Inside Diam., Inches	Brick to Circle
1	Bullhead	4½ x 9 Taper 2½ to 2	84	128
2	Bullhead	4½ x 9 Taper 2½ to 1½	30	63
3	Bullhead	4½ x 9 Taper 2½ to 1	12	36
4	Bullhead	4½ x 9 Taper 2½ to 2¼	180	225

No. 1 KEY



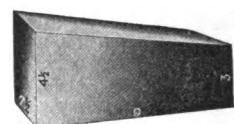
No. 1920

No. 2 KEY



No. 1922

No. 3 KEY



No. 1924

Number	Style	Dimensions, Inches	Inside Diam., Inches	Brick to Circle
1	Key	2½ x 9 Taper 4½ to 4	144	113
2	Key	2½ x 9 Taper 4½ to 3½	72	63
3	Key	2½ x 9 Taper 4½ to 3	36	41
4	Key	2½ x 9 Taper 4½ to 2½	24	30

FIRE BRICK

END SKEW, No. 1



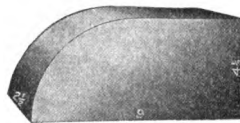
No. 1926

END SKEW, No. 2



No. 1928

ROUND CORNER



No. 1930

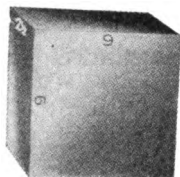
Skew brick, as per illustrations, carried in stock. Any other angles made to order.

PRICES OF SQUARE AND SHAPE FIRE BRICK AND CLAY

(Carload Lots, F. O. B. Denver.)

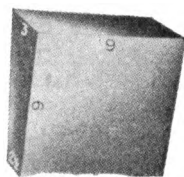
Fire brick, $9 \times 4\frac{1}{2} \times 4\frac{1}{2}$ inches, best grade, re-pressed, per 1000	\$23.00
Shape brick, not exceeding $9 \times 4\frac{1}{2} \times 2\frac{1}{2}$ inches, per 1000	25.00
Ground fire clay, in 100-pound sacks, per ton	5.50

$9 \times 9 \times 2\frac{1}{2}$ INCHES
STRAIGHT



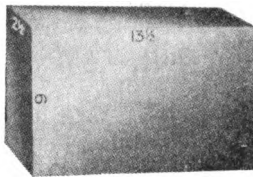
No. 1932

9×9 INCHES, ARCH
TAPER, 3 TO $2\frac{1}{2}$ INCHES



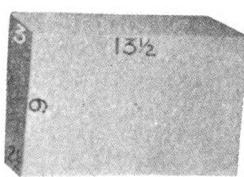
No. 1934

$13\frac{1}{2} \times 9 \times 2\frac{1}{2}$ INCHES
STRAIGHT



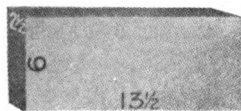
No. 1936

$13\frac{1}{2} \times 9$ INCHES, ARCH
TAPER, 3 TO $2\frac{1}{2}$ INCHES



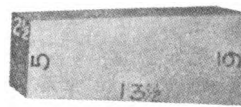
No. 1938

$13\frac{1}{2} \times 6 \times 2\frac{1}{2}$ INCHES
STRAIGHT



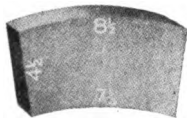
No. 1940

No. 6 KEY
 $13\frac{1}{2} \times 2\frac{1}{2}$ INCHES
TAPER, 6 TO $4\frac{1}{4}$ INCHES



No. 1942

CIRCLE BRICK

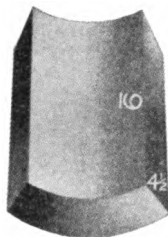


No. 1944

Inside Diam. Inches	No. of Brick to Circle	Inside Diam. Inches	No. of Brick to Circle
17	11	40	22
24	12	48	25
30	14	60	28
36	17	72	32

FIRE BRICK AND TILE

CUPOLA BLOCK



No. 1946

1946 Cupola Blocks. Standard sizes.

Outside Diameter of Lining, In.	Thickness In.
30	4 1/2
36	4 1/2
42	4 1/2
48	5
54	5
60	5

Any other size or shape made to order.

FURNACE LINING



No. 1948

Number to Circle	Weight Pounds per Block
11	20 1/2
12	21
15	22
17	24
18	24
21	24

CYLINDER LINING

We are prepared to furnish linings for revolving roasters, etc., making them of any thickness desired; and with tongue in groove, which makes the lining stay in place better, and allows the lining to be made somewhat thinner.

We guarantee the material and workmanship to be of the highest grade. It may be made with or without shelves for stirring up the material. The most common shelf is merely a plain projection of about two or three inches, there being four or five to the circle. We will be glad to quote upon your specifications.

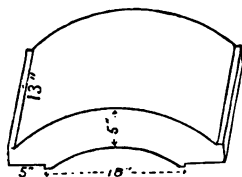
BRASS AND CANDY FURNACE AND CYLINDRICAL STOVE LININGS

Diam., In.	Thickness In.	Height, One Circle, In.	No. to Circle	No. to Set	Diam., In.	Thickness In.	Height, One Circle, In.	No. to Circle	No. to Set
Outside	Inside				Outside	Inside			
18	14	2	6	6	9	7	1	4	5
21	16	2 1/2	8	6	10	8	1	4	5
24	19	2 1/2	12	6	11	9	1	4	5
24	16	4	12	6	12	10	1	4	5
25	18	3 1/2	12	6	13	11	1	4	5
28	18	5	12	6					

With the above standard sizes can be supplied a special flue or throat tile.

TILE

ARCH TILE



No. 1950

For Arching over
Fire Boxes, Price, \$1.15

ARCH TILE



No. 1952

For Arching over
Fire Boxes, Price, \$0.50

FLANGED OR RABBETED TILE



No. 1954

Regular Sizes
12x24x2 1/2 and 12x24x3
Any other sizes made to order

Plain Stove Back Tile. See Rectangular Tile, on following page.

LIST OF STANDARD SIZES OF RECTANGULAR TILE

Thick- ness Inches	Width Inches	Length Inches	Weight Pounds	Thick- ness Inches	Width Inches	Length Inches	Weight Pounds	Thick- ness Inches	Width Inches	Length Inches	Weight Pounds
1	5	16	5	2	12	24	38	3	8	18	28
1	6	16	6	2	14	18	33	3	8	20	31
1	6	18	7	2	14	24	44	3	8	22	34
1	6	20	8	2	16	16	34	3	8	24	37
1	7	18	8	2	16	18	38	3	10	18	36
1	7	20	9	2	16	22	47	3	10	20	39
1	8	20	10	2	16	24	51	3	10	22	43
1 1/2	6	16	10	2	18	18	43	3	10	24	47
1 1/2	6	18	11	2	18	24	59	3	12	18	42
1 1/2	6	20	12	2 1/2	4 1/2	18	13	3	12	20	47
1 1/2	6	22	13	2 1/2	4 1/2	24	18	3	12	22	51
1 1/2	6	24	15	2 1/2	4 1/2	28	21	3	12	24	56
1 1/2	7	16	12	2 1/2	6	18	17	3	12	30	71
1 1/2	7	18	13	2 1/2	6	22	22	3	12	36	84
1 1/2	7	20	15	2 1/2	6	24	23	3	14	18	48
1 1/2	7	22	16	2 1/2	7	18	20	3	14	20	53
1 1/2	7	24	18	2 1/2	7	20	23	3	14	22	58
1 1/2	8	16	13	2 1/2	7	22	25	3	14	24	63
1 1/2	8	18	15	2 1/2	7	24	27	3	14	30	80
1 1/2	8	20	17	2 1/2	8	18	24	3	14	36	99
1 1/2	8	22	19	2 1/2	8	20	26	3	16	24	72
1 1/2	8	24	21	2 1/2	8	22	28	3	16	36	112
1 1/2	10	16	16	2 1/2	8	24	30	3	18	18	63
1 1/2	10	18	18	2 1/2	10	18	29	3	18	22	79
1 1/2	10	20	20	2 1/2	10	22	36	3	18	24	86
1 1/2	10	22	22	2 1/2	10	24	38	3	18	36	130
1 1/2	10	24	24	2 1/2	12	12	23	3	24	24	112
1 1/2	12	24	29	2 1/2	12	14	27	4	8	18	37
2	4 1/2	24	14	2 1/2	12	18	31	4	8	20	41
2	6	18	14	2 1/2	12	22	43	4	8	22	45
2	6	20	16	2 1/2	12	24	46	4	8	24	50
2	6	22	17	2 1/2	12	30	56	4	10	18	47
2	6	24	19	2 1/2	14	14	31	4	10	20	52
2	7	18	17	2 1/2	14	16	41	4	10	22	56
2	7	20	18	2 1/2	14	18	44	4	10	24	61
2	7	22	20	2 1/2	14	20	47	4	10	30	78
2	7	24	22	2 1/2	14	30	64	4	12	18	56
2	8	16	16	2 1/2	16	16	40	4	12	20	63
2	8	18	19	2 1/2	16	18	46	4	12	22	68
2	8	20	21	2 1/2	16	22	57	4	12	24	77
2	8	22	23	2 1/2	16	24	62	4	12	30	93
2	8	24	25	2 1/2	18	18	53	4	12	36	112
2	10	18	25	2 1/2	18	22	65	4	14	18	65
2	10	20	27	2 1/2	18	24	71	4	14	20	73
2	10	22	30	2 1/2	22	24	87	4	14	22	80
2	10	24	33	2 1/2	24	24	92	4	14	24	87
2	12	12	19	3	4 1/2	20	17	4	14	30	109
2	12	14	23	3	4 1/2	22	20	4	14	36	130
2	12	16	25	3	4 1/2	24	22	...	...	...	...
2	12	18	29	3	4 1/2	28	25	...	...	...	...
2	12	20	32	3	4 1/2	30	26	...	...	...	...
2	12	22	35	3	4 1/2	36	33	...	...	...	...

Tiles of 1 inch thickness, 2 cents per pound; 1 1/2 inches, 1 1/2 cents per pound; other sizes, 1 cent per pound. Ask for special quotations for large quantities.

Place your orders with us for special sizes and we will gladly make them for you.

FIRE EXTINGUISHERS



No. 1956



No. 1958

"DRAGON" FIRE EXTINGUISHERS

This fire extinguisher is the latest model and is approved by the National Board of Underwriters.



It is built of heavy Lake Superior cold-rolled copper, and is, we believe, the strongest fire extinguisher of its type on the market.

It differs from other extinguishers in that the method of attaching the dome end bottom to the body of the shell makes the joints the strongest part of the machine. The main sheet of the extinguisher will rupture under heavy pressure before any of the seams will yield.

The dome and bottom are spun, not stamped; the interior is lined by immersing the extinguisher in molten metal; all soldering is done with blow pipe, insuring even heat (no soldering irons used); so-called wiped joints are employed; the bottle holder is of cast brass, not wire; a rawhide gasket is used at the top and a ground joint at the hose elbow; the stopper is of heavy lead and unbreakable.

1956 each \$15.00

"QUICKOUT" FIRE EXTINGUISHERS

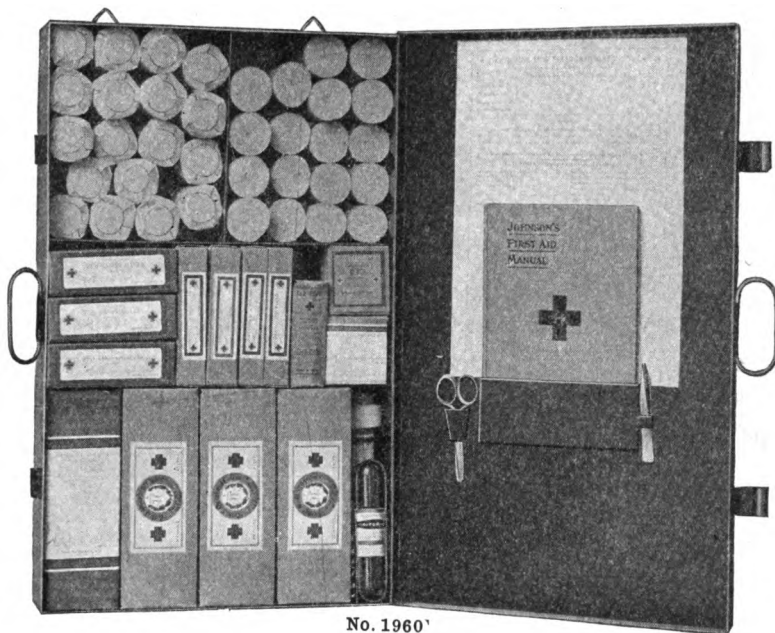
The "Quickout" fire tube contains a perfectly harmless powder. Put up in red color lithographed tin tubes, 22 inches long, $2\frac{1}{8}$ inches in diameter.

All you have to do is to catch hold of the fire tube and give it a jerk from the hook. This pulls off the cap and you flit the powder over the fire, which will be extinguished immediately. The heat liberates carbonic acid gas in large quantities and that smothers the fire.

The tube may hang unused for five years, and the powder will be just as good then as the day you put the tube in place.

1958 each \$1.50

FIRST AID CABINETS



No. 1960

1960 First Aid Cabinets, very compact, put up in heavy black japanned tin carrying case with handles. They contain everything necessary for the treatment of wounds, cuts, bruises, etc. A most practical outfit, and should be found in all mine, mill, and assay offices.

A manual giving full directions for treatment for all accidents is supplied with the cabinet.

LIST OF CONTENTS

Two Johnson's First Aid for Wounds.	Nine Linton Gauze Bandages, 2 inches wide.
Two ounces Red Cross Absorbent Lint.	Nine Linton Gauze Bandages, 2½ inches wide.
One Capsule Iodoform Gauze.	One Jar Carbolyzed Petrolatum.
Six one-yard packages Red Cross Absorbent Gauze.	One Bottle Camphenol and bottle for solution.
Three 4-ounce packages Red Cross Cotton.	One Scissors. One Tweezers.
One Spool "Z O" Adhesive Plaster, 1 inch wide.	One Tourniquet. Two Packages Safety Pins.
Nine Roller Cotton Bandages, 2 inches wide.	One Johnson's First Aid Manual.
Nine Roller Cotton Bandages, 2½ inches wide.	
Price complete.....	\$6.00

EMERGENCY KIT FOR CYANIDE POISONING

1962 According to the Metallurgical Society of South Africa.

This kit consists of hermetically sealed glass tubes containing caustic potash, Ferrous Sulphate and a bottle of Magnesium Oxide.

The outfit has become very popular and is most effective in cyanide poisoning.

Complete (with instructions for use) each \$5.00

FLASKS



No. 1964

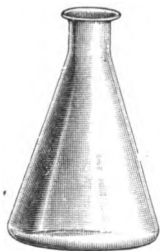


No. 1966

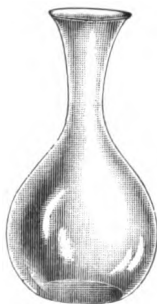


No. 1968

1964	Flasks, Chemical, "Resistance Glass," vial mouth, flat bottom, well annealed.											
	Capacity.....oz.	1	2	4	6	8	12	16				
	Price.....each	\$0.07	.08	.10	.12	.14	.16	.20				
	Capacity.....oz.	24	32	48	64	96	128					
	Price.....each	\$0.25	.30	.40	.50	.60	.80					
1966	Flasks, Chemical, "Resistance Glass," flat bottom, ring neck to bear corking.											
	Capacity.....	4 oz.	6 oz.	8 oz.	12 oz.	16 oz.	24 oz.	32 oz.	3 pt.	½ gal.	¾ gal.	1 gal.
	Price.....each	\$0.10	.12	.14	.16	.20	.25	.30	.40	.50	.60	.80
1968	Flasks, Chemical, "Resistance Glass," round bottom, vial mouth.											
	Capacity.....oz.	2	4	6	8	12	16	32				
	Price.....each	\$0.09	.12	.15	.18	.20	.25	.35				



No. 1970



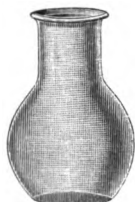
No. 1976



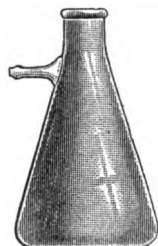
No. 1978

1970	Flasks, Erlenmeyer's, "Resistance Glass."											
	Capacity.....oz.	1	2	4	6	8	12	16	24	32	64	
	Price.....each	\$0.08	.10	.12	.15	.18	.20	.25	.30	.35	.50	
1972	Flasks, Erlenmeyer's, with glass stopper.											
	Capacity.....oz.		4			8		16		32		
	Price.....each		\$0.40			.50		.65		.80		
1974	Flasks, Erlenmeyer's, Jena glass.											
	Capacity.....cc.		50	100	200	300	500	600				
	Price.....each		\$0.10	.11	.14	.18	.25	.28				
1976	Flasks, Copper Determination, "Resistance Glass," pear shaped, wide mouth.											
	Capacity.....oz.	2	4	6	8	16						
	Price.....each	\$0.12	.14	.16	.17	.25						
	Price.....per dozen	\$1.20	1.40	1.60	1.70	2.50						
1978	Flasks, Beaker or Conical, with lip, wide opening, for precipitations, etc.											
	Capacity.....oz.		4	8	16							
	Price.....each		\$0.20	.25	.30							

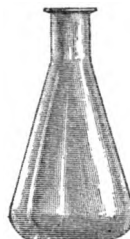
FLASKS



No. 1980



No. 1982



No. 1984

1980 Flasks, Extraction or Carbonic Acid. With extra wide and low necks.

Capacity.....oz.	2	4	6	8
Each.....	\$0.12	.15	.20	.25

1982 Flasks, Filtering. Conical, with side neck, for use with filter pump.

Capacity.....oz.	8	16	32
Each.....	\$0.35	.45	.60

1984 Flasks, Filtering, Bunsen's. Conical, very heavy glass to withstand pressure.

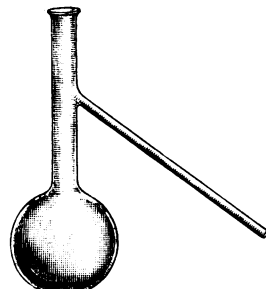
Capacity.....oz.	16	32
Each.....	\$0.35	.60



No. 1986



No. 1988



No. 1990

1986 Flasks, Filtering, Walther's. For use with rubber rings.

Capacity.....oz.	8	16	32
Each.....	\$0.75	1.00	1.25

1988 Flasks, Generating, S. C. Gas bottles.

Capacity.....oz.	8	16	24	32
Each.....	\$0.20	.25	.30	.35

1990 Flasks, Fractional Distillation. With side tube.

Capacity.....oz.	2	4	8	16	32
Each.....	\$0.20	.25	.30	.45	.65

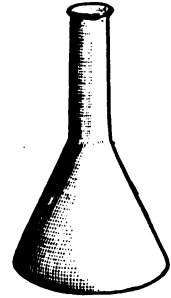
FLASKS



No. 1992



No. 1994

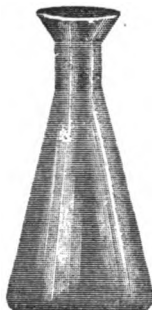


No. 1996

1992	Flasks, Parting or Assay. Conical form, with ring, flat ground top.					
	Capacity.....oz.	1	2	4	6	8
	Each.....	\$0.12	.15	.18	.20	.25
	Doz.....	\$1.20	1.50	1.80	2.00	2.50
1994	Flasks, Parting. Colorado form.					
	Capacity.....oz.		$\frac{1}{2}$		1	2
	Each.....		\$0.10		.12	.15
	Doz.....		\$1.00		1.20	1.50
1996	Flasks, Montana Style. Capacity, 1 oz.....					doz. \$1.20



No. 1998



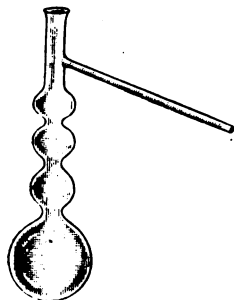
No. 2000



Nos. 2002-2004

1998	Flasks, Low's. For copper determination, with funnel top.					
	Capacity, 4 ounces, each.....					.15
	Capacity, 6 ounces, each.....					.20
2000	Flasks, Low's Form. For treating insoluble residues, with funnel top.					
	Capacity, 4 ounces, each.....					.15
2002	Flasks, Digesting. Bohemian glass, for Kjeldahl's Nitrogen Determination.					
	Capacity.....cc.	200	250	500	750	1000
	Each.....	\$0.20	.25	.35	.40	.50
2004	Flasks, Digesting. Kjeldahl's Jena Glass.					
	Capacity.....cc.	200	300	500	800	1000
	Each.....	\$0.25	.30	.40	.50	.60

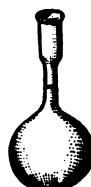
FLASKS



No. 2006



No. 2008



No. 2010

2006 Flasks, Distillation. Ladenburg's, with three bulbs.

Capacity.....cc.	100	200	500	1000
Each.....	\$0.40	.55	.80	1.00

2008 Flasks, Pressure. For digestions, of heavy glass, well annealed, with patent stopper.

Capacity.....cc.	100	150	200
Each.....	\$0.40	.50	.60

2010 Flasks, Polarization. Kohlrausch's, with mark on neck.

Capacity.....cc.	50	100	200	200.6	201.4	401.2
Each.....	\$0.30	.40	.50	.55	.60	.80



No. 2012



No. 2014



No. 2016

2012 Flasks, Sugar. With two marks on neck.

Capacity.....cc.	50 and 55	100 and 110	200 and 220
Each.....	\$0.25	.30	.50

2014 Flasks, Sugar. After Stiff, with funnel-shaped neck.

Capacity, 201.2 cc., each.....	\$0.60
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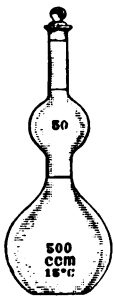
2016 Flasks, Volumetric. "Litre Flasks," most accurately graduated.

Capacity....cc.	10	25	50	100	200	250	300	500	1000	2000
Each.....	\$0.15	.18	.20	.25	.30	.40	.45	.50	.65	1.00

FLASKS

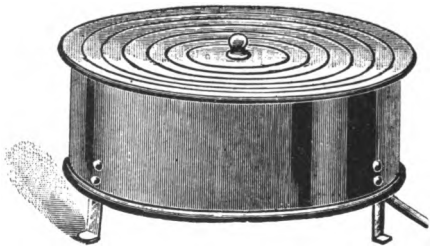


No. 2018



No. 2024

2018	Flasks, Volumetric. With glass stopper.										
	Capacity.....cc.	10	25	50	100	200	250	300	500	1000	2000
	Each.....	\$0.20	.25	.30	.35	.40	.50	.55	.65	.80	1.20
2020	Flasks, Volumetric. Neck with dark enameled stripe on white enameled background, giving a definite meniscus.										
	Capacity.....cc.	100	250	500	1000	2000					
	Each.....	\$0.40	.50	.75	1.00	1.50					
2022	Flasks, Normal Volumetric. With "in and out-pouring mark."										
	Capacity.....cc.	250	500	1000							
	Each.....	\$0.75	1.00	1.25							
2024	Flasks, Giles. Of 1100-cc. capacity; graduated at 1000 and 1100 cc. For use in making up normal solutions, each.....										\$1.50



No. 2026

2026	Flask Heater, Electrical. For laboratory use. A convenient ring top electric flask heater, substantially made of copper, fitted with heater, with controlling switch, and is intended for the many operations where a constant supply of gentle or moderate heat is required. Price of Flask Heater, 8½ inches diameter, over all, 4 inches high, three heats. Six feet of cord and connector switch. 500 watts. Each.....	12.00
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FORCEPS



Nos. 2028-2030



No. 2034

2028	Forceps, Brass, Bent Ends.....	\$0.20
2030	Forceps, Nickel-plated, Bent Ends25
2032	Forceps, Nickel-plated, Straight Ends, Ivory Tips .....	.60
2034	Forceps, Nickel-plated, Bent Ends, Ivory Tips .....	.60



No. 2036



No. 2038

2036	Forceps, Nickel-plated, Fine Points, Non-Magnetic.....	\$0.25
2038	Forceps, Nickel-plated, Extra Stout, Straight.....	.25



No. 2040



No. 2044

2040	Forceps, Nickel-plated, Especially adapted for fine weights.....	.75
2042	Forceps, Plattner's, Nickel-plated, Forceps on Both Ends, with Platinum Tips.....	4.00
2044	Forceps, French style, with Heavy Platinum Tips.....	4.00



No. 2046

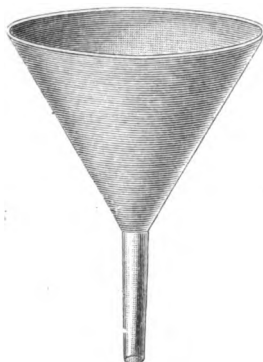


No. 2048

2046	Forceps, Gooseneck, Nickel-plated, 6 inches long.....	\$0.40
2048	Forceps, Steel, Plain, for holding Lead Button while slagging.	
	Size.....inches	4 5 6 7 8
	Price.....each	\$0.10 .12 .20 .30 .40
	Price.....doz.	\$1.00 1.20 2.00 3.00 4.00

Foundry Riddles. See Sieves, page 358, No. 3234.

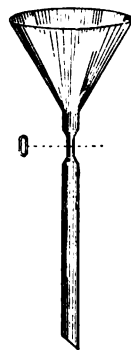
FUNNELS



No. 2050



No. 2056



No. 2060

2050 Funnels, Best German Glass. Angle 60°, stems ground to a point.

Diam.....inches	1½	2	2½	3	3½	4	5
Each.....	\$0.08	.10	.12	.15	.18	.20	.25
Diam.....inches	6	7	8	9	10	12	
Each.....	\$0.30	.40	.50	.65	1.00	1.50	

2052 Funnels, Glass. Plain, pressed.

Diam.....inches	4	5	6	7
Capacity.....ounces	4	8	16	32
Each.....	\$0.10	.12	.15	.20

2054 Funnels, Glass. Plain, stemless, for sugar analysis.

Diam.....inches	3½	4
Doz.....	\$1.50	2.00

2056 Funnels, Glass. Ribbed, pressed.

Diam.....inches	4	5	6	7	8½	10
Capacity.....	4 oz.	8 oz.	1 pt.	1 qt.	½ gal.	1 gal.
Each.....	\$0.12	.15	.20	.25	.40	.70

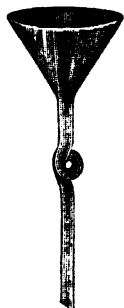
2058 Funnels, Glass. Ribbed, stemless, for sugar analysis.

Diam.....inches	4
Doz.....	\$2.00

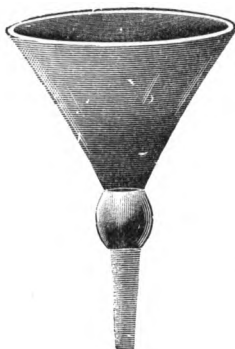
2060 Funnels, Low's Form. Quick filtering, with 6-inch contracted stem.

Diam.....inches	2½	2¾	3
Each.....	\$0.20	.22	.25

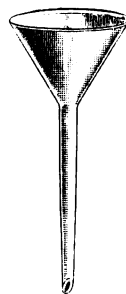
FUNNELS



No. 2062

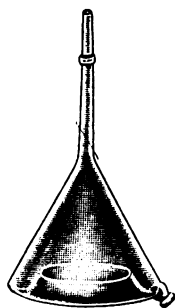


No. 2064



No. 2066

2062	Funnels, Quick Filtering. With 6-inch stem with loop.							
	Diameter.....inches	2½	2¾	3				
	Each.....	\$0.25	.28	.30				
2064	Funnels, Glass. With bulb, for filtering through glass, wood or asbestos.							
	Diameter.....inches	6	8					
	Each.....	\$0.50	.75					
2066	Funnels, Bunsen's. With thin and extra long stems, top ground even, and stem ground to a point, angle 60°.							
	Diameter.....inches	1½	2	2½	2¾	3	3½	4
	Each.....	\$0.12	.14	.16	.18	.20	.25	.30



No. 2068



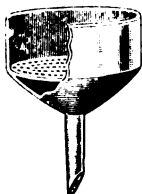
No. 2072

2068	Funnels, Glass. Victor Meyer's, To suspend over evaporating dishes, with tubulature.							
	Diameter.....inches	6	8	10				
	Each.....	\$1.00	1.25	1.75				
2070	Funnels, Porcelain. Plain, with handle.							
	Diameter.....inches	4	5	6	7			
	Each.....	\$0.40	.70	1.00	1.40			
2072	Funnels, Porcelain. Ribbed inside, with handle.							
	Diameter.....inches	4	5	6	7			
	Each.....	\$0.50	.80	1.25	2.00			

FUNNELS



No. 2074



No. 2076



No. 2078

2074 Funnels, Hirsch's. Porcelain, for filtering by pressure, with fixed perforated porcelain plate.

Diameter.....inches	2 $\frac{1}{4}$	3 $\frac{1}{2}$
Each	\$0.50	.75

2076 Funnels, Buechner's. Porcelain, with fixed perforated porcelain plate, straight walls.

Diameter.....inches	4	6	8
Each	\$1.25	2.00	3.00

2078 Funnels. Agateware.

Capacity.....qts.	$\frac{1}{2}$ pt.	1 pt.	1 qt.	$\frac{1}{2}$ gal.	1 gal.
Each	\$0.35	.40	.45	.50	.60



No. 2080



No. 2082



No. 2084

2080 Funnels. Hard rubber.

Capacity.....oz.	4	6	8	16	32
Each	\$0.40	.50	.60	.70	.80

2082 Funnels. Porcelain, perforated, small holes.

Diameter.....inches	4	5	6	8
Each	\$0.65	.90	1.40	1.80

2084 Funnels. Porcelain, perforated, with large oval holes.

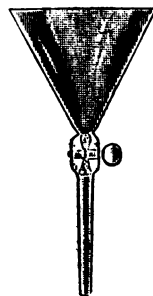
Diameter.....inches	4	5	6	8
Each	\$0.65	.90	1.40	1.80

Funnels, Gooch Filtering. See Tubes, page 399, No. 3736.

FUNNELS



No. 2086



No. 2088

2086 **Funnels, Hot Water or Steam.** Very desirable for the filtration of inflammable liquids. Complete.....each \$2.50

2088 **Funnels, Separatory.** Open top, usual form, angle 60°, with stopcock.

Diameter.....inches	3	4	5	6	7
Each.....	\$1.25	1.50	1.75	2.50	3.00



No. 2090



No. 2092



No. 2094

2090 **Funnels, Separatory.** Cylindrical shape, with stop-cock.

Capacity.....oz.	2	4	6	8
Each.....	\$1.00	1.10	1.20	1.40

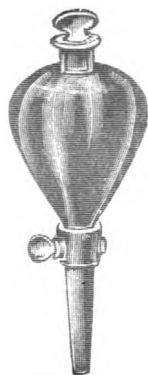
2092 **Funnels, Separatory.** Cylindrical, stoppered.

Graduated 100 cc. in 1 cc..... \$2.00

2094 **Funnels, Separatory.** Globe shape, light stoppered.

Capacity.....oz.	2	4	6	8	16
Each.....	\$1.00	1.20	1.35	1.50	2.00

FUNNELS



No. 2096

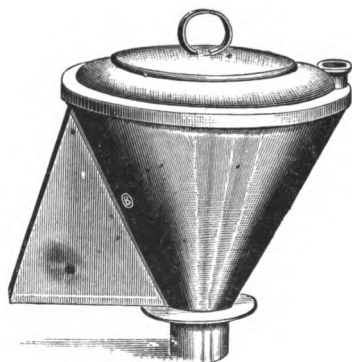


No. 2098



No. 2100

2096	Funnels, Separatory. Globe shaped, heavy glass, stoppered.					
	Capacity.....	pts.	1	2	4	8
	Each.....		\$2.00	2.50	3.00	4.00
2098	Funnels, Separatory. Squibb's. Stoppered.					
	Capacity.....	oz.	4	8	16	
	Each.....		\$1.25	2.00	2.50	
2100	Funnels, Dropping, Walter's. For examining single drops.					
	Capacity, 60 cc. each.....					\$1.50



Nos. 2102-2104

2102	Funnels, Plantamour's. Tin, for hot filtrations, 5¼ inches on top inside.	
	Each.....	2.00
2104	Funnels, Plantamour's. Copper, for hot filtrations, 5¼ inches on top inside, each	3.00

FUNNELS



No. 2106



No. 2108



No. 2110

2106 **Funnels, Copper.** Double wall on three iron legs. For hot filtrations; diameter, 6 inches, each..... \$4.00

2108 **Funnel Tubes.** Thistle top.

Length..... inches	8	10	12	15
Each.....	\$0.06	.08	.10	.12

2110 **Funnel Tubes.** Conical top.

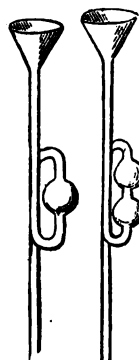
Length..... inches	10	12	15	18
Each.....	\$0.10	.12	.15	.18



No. 2112



No. 2114



No. 2116

2112 **Funnel, or Safety Tubes.** Bent; thistle top..... \$0.20

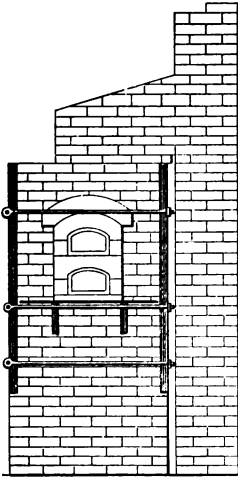
2114 Same as above. Conical top..... .20

2116 **Funnel, or Safety Tubes.** With bulbs; funnel top.

No. of bulbs.....	1	2	3
Each.....	\$0.20	.25	.30

MUFFLE FURNACES FOR COAL, COKE, WOOD OR OIL

SECTIONAL FIRE CLAY TILE LINING



No. 2118

2118 These tile-lined furnaces are to be recommended over anything in the market for an assay office having a sufficient volume of work to need a large furnace. They have been in use for a number of years, and a great many having been sold, there is no question as to the satisfaction and durability. As they are adaptable for any fuel, they are suitable for any region.

The lining of these furnaces is made of tiles, rabbetted to fit together properly, each tile being lettered and its location shown on the blue print which we supply with the furnace. It does not require an expert brick mason to build these furnaces, and they can be built much more quickly than if lined entirely with brick; furthermore, there is nothing left to the judgment of the brick mason, which might result in a very poor furnace if he is not experienced in furnace building.

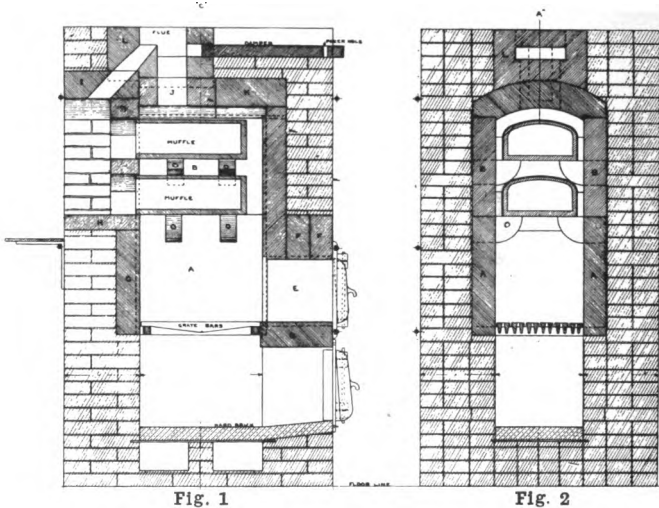


Fig. 1

Fig. 2

The general arrangement of these furnaces is shown in the sectional views, Figures 1 and 2, the cuts being of the two-muffle back-fire furnace. The furnace fired from the back, that is, the side opposite the muffle opening, is to be preferred, as the distribution of the heat is more even. We can, however, supply them to fire from either side. The single-muffle furnace is identical with the two-muffle furnace, except for the omission of the lower muffle. The three-muffle furnace has the muffles arranged two below and one above in the centre. The regular pattern of this three-muffle furnace fires from either side, but it can also be supplied to be fired from the back.

MUFFLE FURNACES FOR COAL, COKE, WOOD OR OIL

No. 2118

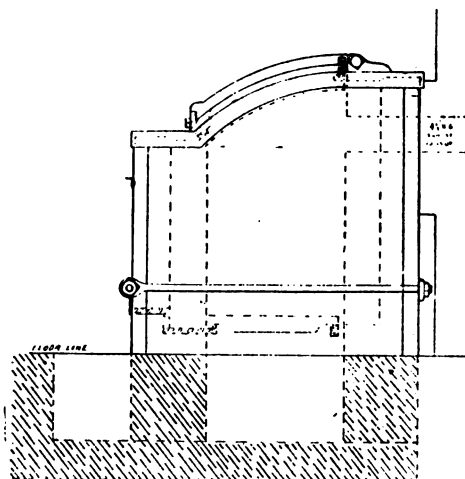
SECTIONAL FIRE CLAY TILE LINING

The coke furnace is only made in a single muffle size. The furnaces for wood and for oil are quite similar to the coal furnaces, proper changes being made in the fire box to adapt them to the different fuel.

These furnaces are jacketed with red brick, and the entire furnace is securely bound with angle irons and tie rods. We recommend that the stack be built at the side of the furnace, as it is not best to place the heavy weight of the stack on the furnace proper. The stack should be lined for some little distance with fire brick, for the heat in the stack may be too high for common brick, the fire brick for the stack, and the red brick for the stack and furnace jacket, are not supplied; but the price includes everything else necessary: The fire clay tile lining for the furnace and for the short diagonal flue leading to the stack, grate bars with support bars, angle irons and tie rods, fire boxes and ash pit doors, an iron shelf with brackets (for the front of the furnace), etc.

Size-for	Muffle Size	Fuel	Floor Space Approx. Furnace Only, Inches	Price
Two "NN"	10½ x 19 x 6½	Coal or oil	3'6 x 4'	\$60.00
One "NN"	10½ x 19 x 6½	Coal or oil	3'6 x 4'	50.00
Three "NN"	10½ x 19 x 6½	Coal or oil	3'6 x 4'	65.00
Two "NN"	10½ x 19 x 6½	Wood	3'6 x 4'	60.00
One "NN"	10½ x 19 x 6½	Wood	3'6 x 4'	50.00
One "NN"	10½ x 19 x 6½	Coke	3'6 x 4'	55.00
Two "QQ"	12½ x 19 x 7¾	Coal or oil	3'8 x 4'	65.00
One "QQ"	12½ x 19 x 7¾	Coal or oil	3'8 x 4'	55.00
Three "QQ"	12½ x 19 x 7¾	Coal or oil	3'8 x 4'	70.00
Two "QQ"	12½ x 19 x 7¾	Wood	3'8 x 4'	65.00
One "QQ"	12½ x 19 x 7¾	Wood	3'8 x 4'	55.00
One "QQ"	12½ x 19 x 7¾	Coke	3'8 x 4'	60.00
Two "UU"	14 x 19 x 7¾	Coal or oil	3'9 x 4'	70.00
One "UU"	14 x 19 x 7¾	Coal or oil	3'9 x 4'	60.00
Two "UU"	14 x 19 x 7¾	Wood	3'9 x 4'	70.00
One "UU"	14 x 19 x 7¾	Wood	3'9 x 4'	60.00
One "UU"	14 x 19 x 7¾	Coke	3'9 x 4'	65.00

BULLION OR MELTING FURNACES



No. 2120

2120 Shows our furnace for the use of graphite or other crucibles in an open furnace where coke is available and which will prove an exceedingly satisfactory furnace.

It is lined with fire clay tile, rabbetted and lettered so that the proper location of each piece is readily found by reference to the blue print supplied with the furnace; thus the erection of this furnace does not require a brick mason of special skill and experience.

The design is such that the crucible is easily lifted out of the fire, on account of the front of the furnace being very low (only 28 inches above the floor). The top of the furnace is covered with a heavy cast iron frame and the door is formed by a fire clay tile which is clamped in a skeleton frame, hinged on the furnace top, there being no iron work exposed to heat.

The ash pit is below the floor level, but the grate bars are high enough, so that they can be easily raked from the under side.

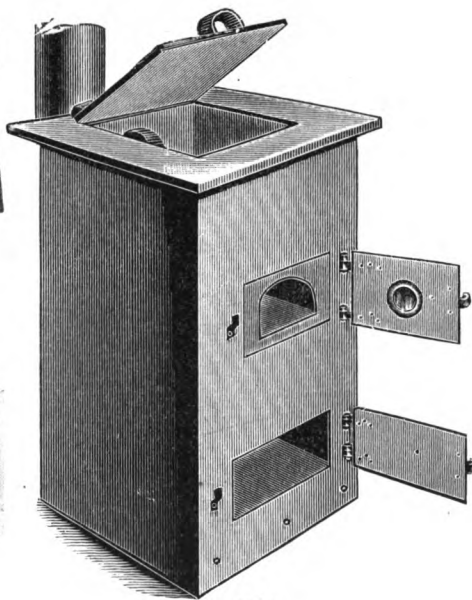
The price of the furnace includes the fire clay tile and the iron work necessary to erect the furnace, in fact, everything necessary except the red brick jacket and the fire brick for the stack.

Price, for No. 30 to No. 80 black lead crucible..... \$50.00

ASSAY FURNACES



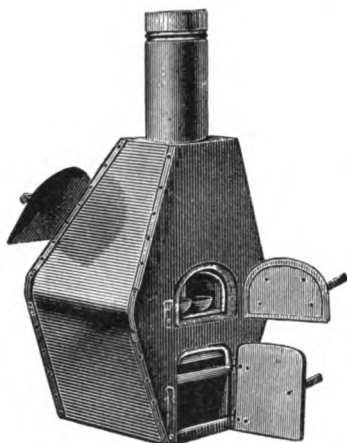
No. 2122



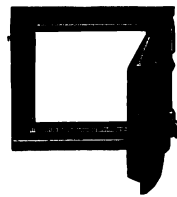
No. 2124

- 2122 Furnace, our own manufacture.** Of fire clay, in three sections, securely bound with iron bands, with one muffle.
 For 9x15 muffle \$40.00
 For 10x16 muffle 40.00
- 2124 Furnace, Brown's, our own manufacture.** Size, 29 inches high, 14 inches deep and 16 inches wide; taking muffle 12x6x4 inches. The best and cheapest furnace made, having no complicated parts to get out of order; it can be used both for muffle work and for crucible operations. There is no other furnace manufactured of similar dimensions and weight which can accommodate such large muffles, and consequently produce so much work and so rapidly. Being made of heavy sheet iron, it cannot be broken by handling nor injured by heating. Boxed, this furnace weighs 175 pounds, as against 250 to 400 pounds of other furnaces. This furnace is from one-third to two-thirds cheaper than any other furnace which will do equally good work. Price, packed for shipment, with one muffle. 25.00

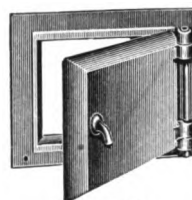
ASSAY FURNACES



No. 2126



No. 2128



No. 2130

- 2126 **Furnace, No. 1 Assay, "Burro."** A very complete and satisfactory portable furnace. Made of fire clay, in one piece, and securely bound with steel; doors asbestos lined; weight, 100 pounds, taking muffle 6x12x4 inches. With one muffle.....each \$25.00
- 2128 **Furnace Doors.** Heavy iron frame and door with fire clay lining, inside measurements, 11 inches high, 13 inches wide. Has lugs on the frame, so that it is supported and clamped to place by the binding rods of the furnace, no anchor bolts being necessary.
- | | |
|------------------------------|------|
| Each | 4.50 |
| Extra fire clay lining | .50 |
- 2130 **Furnace Doors.** With heavy iron frame and door without linings; inside measurements, 11 inches high, 13 inches wide. This door has four holes in the frame for anchor bolts.....net each 4.00

When ordered specially, this door can be lined with fire clay tile lining, at 50 cents extra.

Furnace Doors. See, also, Muffle Doors, page 320, Nos. 2856-2860.



No. 2132

- 2132 **Furnace Grate Bars.** Of cast iron.
- | | | | | | | | | | | |
|-------------------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Length.....inches | 12½ | 14 | 16 | 18 | 20 | 22 | 24 | 25 | 27 | 30 |
| Each, net..... | \$0.18 | .20 | .28 | .30 | .40 | .45 | .50 | .55 | .65 | .70 |

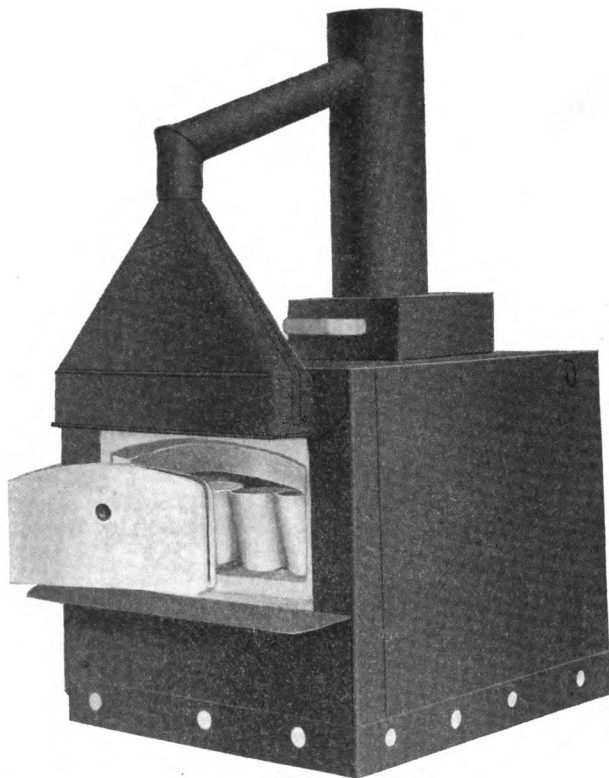
NOTE—In estimating number required to cover fire box surface, figure each complete bar 2½ inches wide.

Furnace Blowers. See page 80, No. 792.

Furnace Pokers. See under Pokers, page 337, No. 3007.

COLORADO MUFFLE FURNACES

FOR GAS, GASOLINE OR OIL



No. 2134

Colorado Muffle Furnaces are designed to meet the needs of a furnace simple and practical and giving an even heat, high or low, oxidizing, or reducing, as required. They are heated quickly, and are convenient, clean and efficient in operation. The capacity for crucibles and scorifiers is great, as the muffles are of the square high shouldered type, with every bit of the space available, permitting the use of larger crucibles.

The Cary Burners (for gasoline), which we recommend to heat these furnaces, have proven themselves to be very efficient, giving high heat with a minimum expense for fuel, on account of the perfect combustion of the gases.

Sufficient space is allowed within the furnace for proper combustion, and as the walls are thick, the heat is given to the muffle with small loss due to radiation, etc. The furnaces are made of strong, thoroughly burned material, and have good lasting qualities.

More specific information concerning gas or oil furnaces will be given upon request.

COLORADO MUFFLE FURNACES

FOR GAS, GASOLINE OR OIL

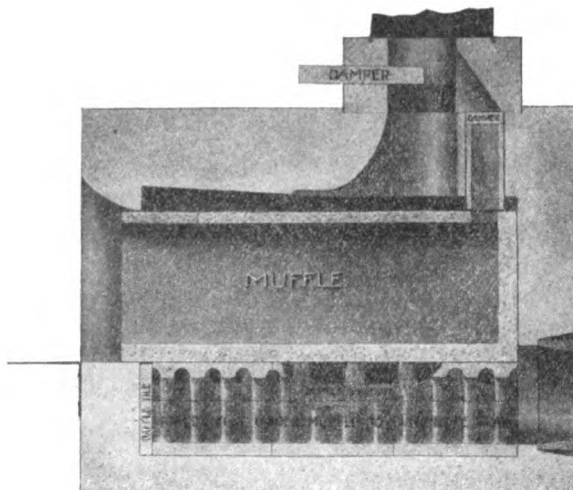


Fig. A—Nos. 1-5
SECTIONAL VIEW.

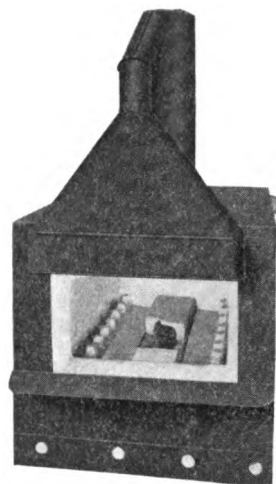


Fig. B
WITH MUFFLE REMOVED
TO SHOW INSIDE ARRANGEMENT

No. 2134

A clear idea of the construction is given by reference to Figs. A and B.

The flame enters the furnace from the back, going into the central flame channel, or flue. The ribs of this flue deflect the heat, apportioning it so that both the back and front of the muffle are heated evenly. The flame channel is covered, its roof protects and supports the muffle in the center, there being another row of supports on either side. If the flame struck the muffle directly it would be heated unequally, resulting in a tendency to crack it, but on account of the thorough supporting and the even heating, the muffles are very durable.

The ventilation of the muffle is under positive control, by moving the handle which slides the damper over the special vent flue, in or out. The main draft may also be regulated by a damper. All the furnaces (except the No. 1 or Prospector's size) are provided with a hood which prevents the escape of lead fumes into the room.

The Colorado Furnaces are the result of most painstaking thought and thorough experiment, and are sold entirely on their merits.

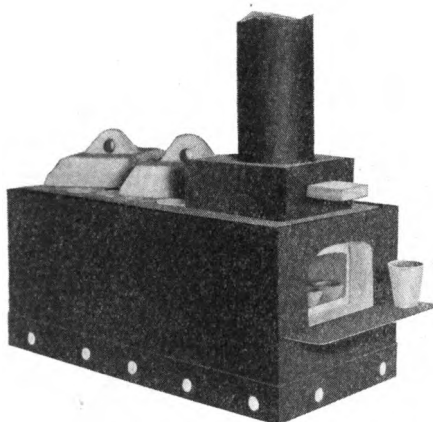
Furnace size.....No.	1	2	3	4	5
	(Prospector's)				
Muffle letter.....	LA	LB	LC	LD	LE
Dimensions.....	6½x7x4½	6½x10x4½	8½x12x5½	10¾x16x6	15x18x7
Capacity,	4-10	6-10	8-15	15-15	24-12
crucibles.....gr.			or 12-20	or 12-20	or 20-15 or 20-20
Net weight.....lbs.	55	140	200	300	425
Gross weight.....lbs.	65	175	245	350	500
Each.....	\$15.00	20.00	32.50	40.00	55.00
Burner, recommended	1¼-in. Cary or Advance	1½-in. Cary	2-in. Cary	2¼-in. Cary	2¼-in. Cary

Iron stands for any of the above furnaces, \$20.00 extra.

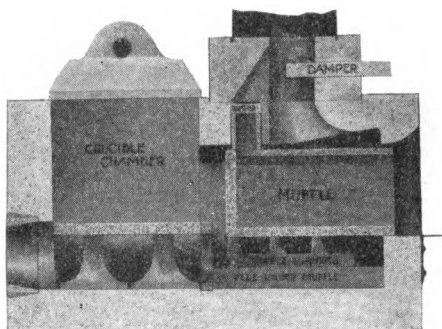
Furnace Blow Pipe Tanks. See page 87; Cary Burners, pages 241-244.

COLORADO COMBINATION FURNACES

FOR GAS, GASOLINE, OR OIL



No. 2136



SECTIONAL VIEW

Colorado Combination Furnaces are the Colorado Muffle and Crucible Furnaces combined, embracing the essentials and the good points of each separate furnace.

The flame enters the crucible end of the furnace; a portion of it passes up through the crucible chamber, heating the crucibles there, but not striking them directly. This portion and the rest of the flame then goes through into the muffle end of the furnace, and by the time the first fusion is completed in the crucible chamber the muffle is hot enough for scorification or cupellation, after which both ends of the furnace may be worked at the same time.

The furnace, therefore, has a large capacity, especially as the muffle is of the square, high shouldered shape, and all of the room within it can be utilized.

A small special flue gives a good draft through the muffle, which may be regulated by sliding the damper in or out. The main draft may also be regulated by a damper.

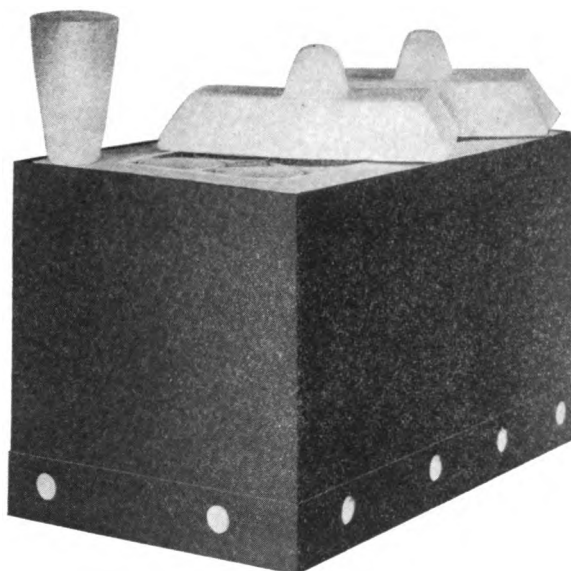
Furnace size.....	No.	21	22	23
Muffle letter.....		LX	LX	LX
Dimensions.....	in.	6x8x3½	6x8x3½	6x8x3½
Capacity, crucible.....		2-20 gr. or G's	4-20 gr. or G's	8-20 gr. or F's
Net weight.....	lbs.	170	200	225
Gross weight.....	lbs.	210	245	275
Each.....		\$25.00	30.00	35.00
Burner recommended.....		1½-in. Cary or Advance	1½-in. Cary	2-in. Cary

Iron stands for above furnaces, \$20.00 extra.

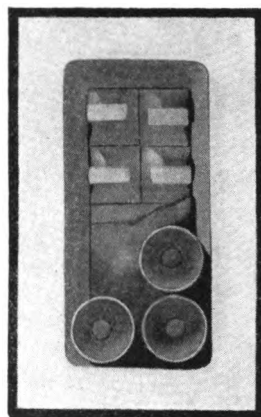
Furnace Blow Tank Outfits. See page 87; Cary Burners, pages 241-244.

COLORADO CRUCIBLE FURNACES

FOR GAS, GASOLINE OR OIL



No. 2138



TOP VIEW

Colorado Crucible Furnaces have been designed with the same care that is put upon the muffle furnaces.

The main objection to an open fire furnace has been overcome in ours, which is especially easy on crucibles, as the flame does not strike them directly.

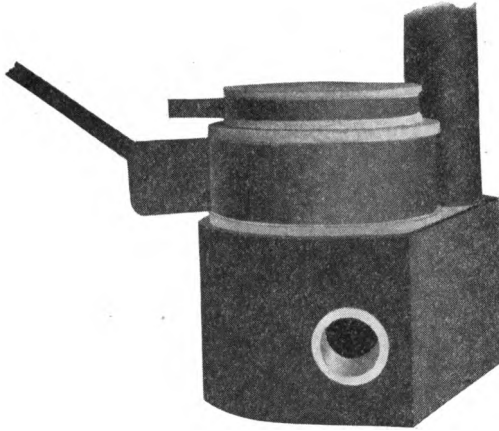
The flame enters the furnace below the plate, or bottom, of the crucible chamber, there being room around the edge to allow it to go up into the crucible chamber proper. The crucibles are set upon this plate, and as the flame does not strike them directly, they are heated evenly and not subjected to the strains due to unequal heating, and are, therefore, much less liable to crack, causing a loss of work, with the attendant annoyance, etc.

Furnace size.....No.	11	12	13	14
Capacity, crucibles.....	6-J	8-F or 20 gr.	12-F or 20 gr.	16-F or 20 gr.
Net weight.....lbs.	160	125	175	215
Gross weight.....lbs.	210	155	220	265
Each.....	\$20.00	20.00	25.00	27.50
Burner recommended....	2-in. Cary	1½-in. Cary	2-in. Cary	2¼-in. Cary

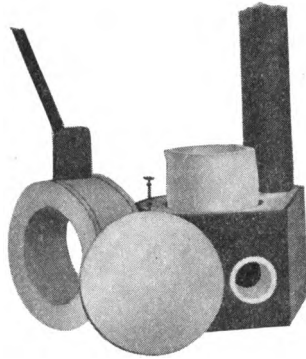
Iron stands for above furnaces, \$15.00 extra.

Furnace Blow Pipe Tanks. See page 87; Cary Burners, pages 241-244

COLORADO MELTING FURNACES



Nos. 41 TO 46 ASSEMBLED



Nos. 41 TO 46 WITH RING AND COVER REMOVED

No. 2140

The Colorado Furnaces of the following sizes are especially suited to the melting of cyanide precipitates, bullion, brass, etc., and to the retorting of amalgam. The flame is thrown in tangentially and swirls around the crucible instead of striking it directly, thus heating it more evenly and prolonging its life as it is relieved of the liability of cracking due to uneven strains.

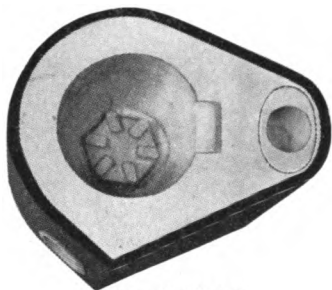
Sizes Nos. 41, 42 and 43 are made of three parts, viz.: The lower or main body; the ring, which, when removed, exposes the crucible down to the bilge so that it is gripped easily with tongs and removed; and the cover.

Sizes Nos. 44, 45 and 46 are made in two pieces: The main body and the cover. Sufficient room has been allowed around the crucible for the insertion of tongs and the ready removal of the crucible.

The crucible is set upon a replacable stool, which exposes the bottom to be heated.

COLORADO MELTING FURNACES

LOOKING DOWN ON FURNACE



Nos. 41 TO 46

No. 2140

A retort may be used with these furnaces for the retorting of amalgam by removing the regular cover and ring, replacing them with a retort ring on which the retort proper is set. For Retort Rings, see page 407, No. 3822.

Colorado Furnace.....	No.	41	42	†43	44	45	46
Capacity, graphite crucible	No.	7	25	45	45	80	125
Crucible chamber, diam.....	in.	6¾	10½	14	14¾	18	20
Crucible chamber, depth.....	in.	9½	13¾	17½	17½	20	21
Net weight.....	lbs.	100	200	360	365	575	650
Gross weight.....	lbs.	140	245	446	440	730	800
Price.....	*each	\$18.00	25.00	30.00	30.00	45.00	60.00
Price, stand, extra.....	each	\$10.00	10.00	12.00	12.00	15.00	15.00
Burner recommended.....	Advance	2-in	2¼-in.	Two 2-in.	Two 2¼-in.	Two 2-in.	
	or 1¼-in. Cary	Cary	Cary	Cary	Cary	Cary	

*Without burner, crucible or stand.

†Can be supplied for 2 burners if required.

HINTS FOR FURNACE AND BURNER MANAGEMENT.

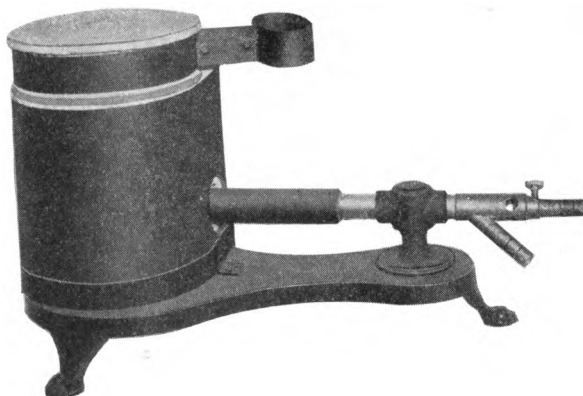
The burner should fit tight against the burner boss, which should be the right size for the burner used. The generation of gas within the burner is dependent upon heat reflected against the front, but the burner must not be too hot or it will burn. A leakage of flame between the boss and the burner will overheat the burner head.

In shutting off the burner, it is better to close the valve in the supply pipe, and not shut the valves in the burner at all, for if the latter are closed tight, when the burner is hot, an injury to the seats may result due to contraction in cooling. Brass is very weak, especially when hot.

When through firing, the furnace should be shut up and allowed to cool slowly, closing the damper in the main pipe, and putting the muffle door or cover in place. The burner should be swung away from the burner hole or else a piece of asbestos slipped in front of it. The reflected heat against the idle burner might burn its head; when the burner is going, sufficient cold air and gas are drawn through the burner to keep it at a relatively low heat.

COLORADO MELTING FURNACES

Nos. 31 to 34 FURNACES

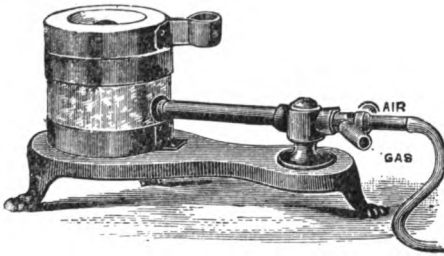


No. 2142

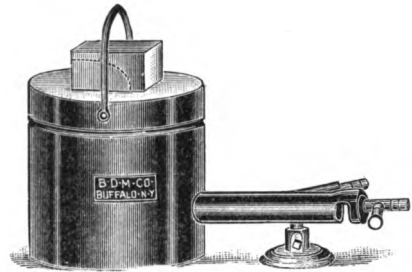
These furnaces have found favor with jewelers and others requiring a small furnace, capable of high temperatures, for melting gold, silver, etc. The flame enters tangentially and swirls around the crucible instead of striking it directly, thus heating it more evenly and relieving it of unnecessary strains and prolonging its life. The crucible may be removed readily, ample room for tongs being allowed. The larger sizes of the furnaces consist of three pieces. The bottom or main body; the ring, which, when removed, exposes the bilge of the crucible to facilitate gripping it with tongs; and a cover. They are made of a mixture to stand the severe strains of expansion and contraction and are substantially bound with iron.

Colorado Furnace.....	31	32	33	34
Capacity, one crucible:				
Graphite.....No.	1	3	7	16
Hessian Sand.....in.	3x4	3¾x4½	..	..
Colorado.....	20 gr.	..	..	..
Fuel.....	Gas	Gas	Gasoline, Gas or Oil	Gasoline, Gas or Oil
Burner recommended.....	Special	Special	Advance	Advance
Net weight.....lbs.	7	22	45	105
Gross weight.....lbs.	10	30	60	135
Price complete, with burner.....each	\$4.00	5.00	..	...
Price complete, without burner.....each	...	...	8.00	12.00
Price of parts:				
Main body, only.....each	\$0.75	3.25	5.00	8.00
Ring, only.....each	...	...	2.50	3.00
Cover, only.....each	\$0.35	.75	1.00	1.50
Burner, only.....each	\$1.50	1.50	5.00	5.00
Stand, only.....each	\$0.90	...	...	...

GAS FURNACES



No. 2144



No. 2146

FLETCHER'S CRUCIBLE FURNACE WITH INJECTION GAS BURNER, No. 40A

2144 The burner is almost noiseless in operation, and works with a very small supply of gas, producing much more economical results than any gas burner heretofore used for the purpose of heating furnaces. Gas supply pipe required, $\frac{3}{8}$ -inch. Will operate with illuminating gas, natural gas or gasoline gas, without alteration. The amount of air and gas used by this furnace is very small. Outside dimensions of clay parts, $4\frac{1}{8} \times 5\frac{3}{4}$ inches high; pot inside, $2\frac{3}{8}$ -inch diameter by $2\frac{1}{2}$ inches deep. Furnace on stand, $6\frac{1}{2}$ inches high over all.

Price.....	net	\$3.50
Parts—Furnace Body.....		.75
Furnace Body and Cover.....		1.10
Burner, alone.....		1.50
Stand, without Burner.....		.90

FLETCHER'S PERFECTED INJECTOR GAS FURNACES, Nos. 41 AND 41A

2146 For metallurgists, jewelers, chemists, manufacturers of iron and brass castings, and other purposes where an ordinary furnace is useless or unreliable, this furnace, founded on the well-known Injector Furnace, is without question the best and simplest gas furnace made. The burner is in one casting, and the nozzle does not readily become overheated.

No. 41 Pot and Cover, dimensions: outside, $6\frac{1}{2}$ inches diameter by $7\frac{1}{4}$ inches high; inside, $3\frac{1}{2}$ inches deep by $3\frac{1}{2}$ inches diameter. Capacity 1-12 gm. Clay or 1, No. 4 Black Lead Crucible.

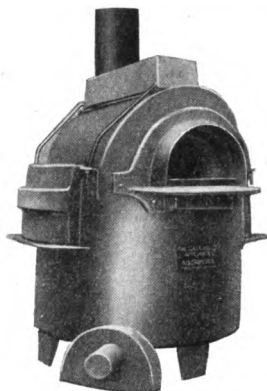
No. 41A Pot and Cover, dimensions: outside, 9 inches diameter by 10 inches high; inside, $5\frac{1}{2}$ inches deep by $4\frac{3}{4}$ inches diameter. Capacity 1, No. F Clay or 1, No. 3 Black Lead Crucible.

Crucible Furnace, No. 41	\$4.50
Crucible Furnace, No. 41A	7.00

PRICES FOR SEPARATE PARTS

No. 41 Furnace Body.....	\$2.25
No. 41 Furnace Body, Cover and Dome.....	3.00
No. 41A Furnace Body.....	4.00
No. 41A Furnace Body, Cover and Dome.....	5.00
Nos. 41 or 41A Crucible Support.....	.15
No. 41 Burner.....	1.50
No. 41A Burner.....	2.00

ADVANCE COMBINATION FURNACES



Nos. 2148-2152

THE CALKINS ADVANCE COMBINATION MELTING AND MUFFLE FURNACE
No. 3

2148 Same design and general construction as furnaces Nos. 5 and 10, and intended for the use of prospectors and examining engineers. Dimensions: 11 inches outside diameter x 19 inches high. Crucible chamber 7 inches diameter x 6 inches high. Muffle, 3x4 $\frac{3}{4}$ x7 inches. Weight, 50 lbs.

Price.....net \$18.00

THE ADVANCE COMBINATION MELTING AND MUFFLE FURNACE
No. 5

2150 This No. 5 combination furnace was especially designed to meet the demands of such engineers and assayers who find it advisable or necessary to complete their tests on the property under examination. Holds five 20-gram crucibles in the crucible chamber. The muffle will accommodate 12 or more cupels at one time.

The amount of gasoline needed to operate this furnace to its full capacity will not exceed one-half of a gallon per hour.

One burner furnishes ample heat for melting and cupelling simultaneously. The flame from the burner is not, as in other assay furnaces, injected against the crucibles but is injected into the crucible chamber at a point tangent to the inner circumference and impinges on the circular wall and swirls around the crucibles. This manner of firing saves the crucibles; as any competent assayer knows that it is very destructive to crucibles to play a hydro-carbon flame directly upon them.

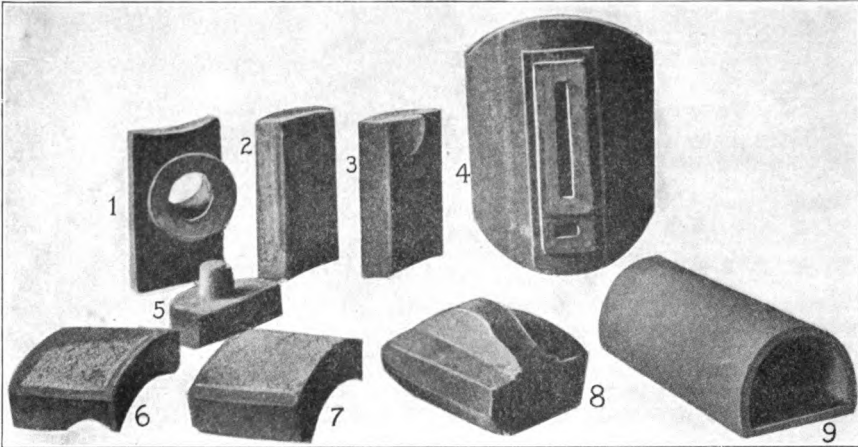
Furnace measures 14 inches outside diameter and 20 inches high over all; the crucible chamber is 8 inches inside diameter, 6 inches high in the clear; the muffle is 3x4 $\frac{3}{4}$ x8 inches; weight, 85 pounds.

The "Challenge" Hydro-Carbon Burner is especially adapted for use with this furnace. Price.....net \$23.50

THE CALKINS ADVANCE COMBINATION MELTING AND MUFFLE FURNACE
No. 10

2152 Same in construction as the No. 5. This furnace holds ten 20-gram crucibles in the melting chamber. Muffle measures 4x6x12 inches and will accommodate eighteen 1 $\frac{1}{2}$ -inch cupels. Operated by "Challenge" Burner. Weight, 180 lbs.

Price.....net \$28.50

ADVANCE COMBINATION FURNACES**EXTRA PIECES OF FIRE BRICK LINING****No. 3 FURNACE**

Nos. 1, 2, 3, 6 and 7 combined.....	\$3.00
No. 4, Dome.....	5.00
No. 5, Muffle Plug.....	.30
No. 8, Door.....	.50
No. 9, Muffle.....	.75

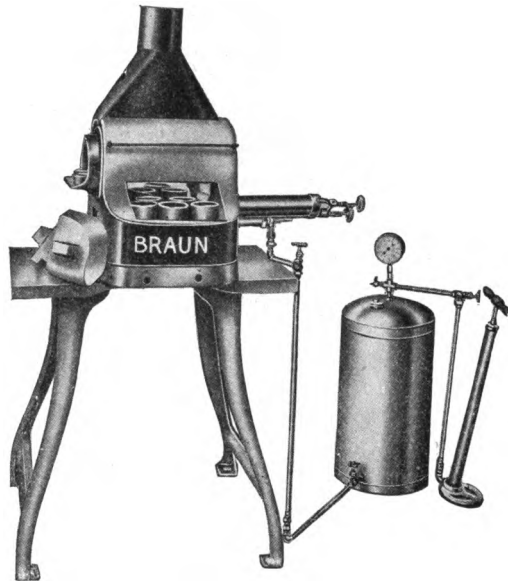
No. 5 FURNACE

No. 1, Burner Hole Brick.....	1.25
No. 2, Front Brick.....	.65
No. 3, Back Brick.....	.75
No. 4, Dome.....	6.00
No. 5, Muffle Plug.....	.30
No. 6, Side Brick Near Burner.....	.50
No. 7, Side Brick.....	.50
No. 8, Door.....	.65
No. 9, Muffle.....	.75

No. 10 FURNACE

No. 1, Burner Hole Brick.....	1.50
No. 2, Front Brick.....	.75
No. 3, Back Brick.....	1.00
No. 4, Dome.....	7.00
No. 5, Muffle Plug.....	.40
No. 6, Side Brick Near Burner.....	.60
No. 7, Side Brick.....	.60
No. 8, Door.....	.75
No. 9, Muffle.....	.90

N. B. In ordering, please state the number of the furnace.

BRAUN COMBINATION FURNACES

No. 2154

ROTARY FLAME COMBINATION FURNACES

Patented April 1, 1902

The illustration shows Furnace No. 40 with Cary Hydrocarbon Burner and Tank Outfit.

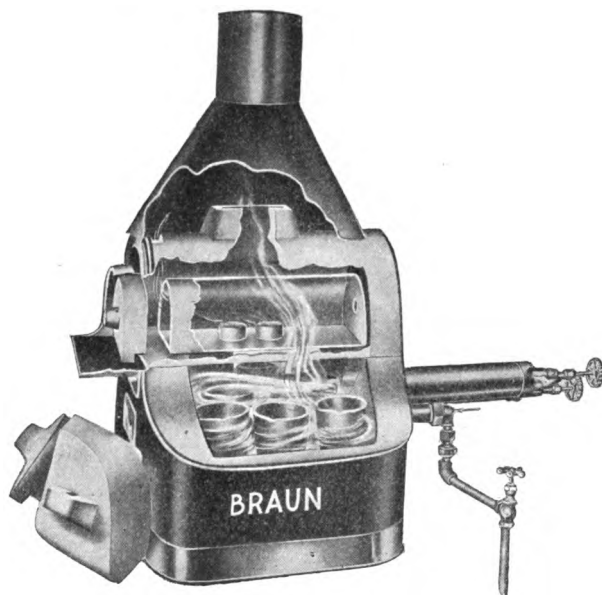
These furnaces are constructed in such a manner that the muffle is placed above the crucible compartment, and in this respect differs from our other types of combination muffle and crucible furnaces. In this furnace a large crucible compartment is obtained, and the different portions of this compartment are, to a limited extent, of different temperatures.

The burner hole opening of the furnace is located in the centre of one side, and the flame from the burner is forced toward the opposite wall of the furnace where it is deflected to both sides of the chamber by a brick of special shape, which forces the flame in a rotary motion around both sides of the crucible compartment. This brick is always in the hottest part of the flame, thus saving the fire clay lining of the furnace, and, being separate, can easily be replaced at a slight cost.

Each cover for the crucible compartment is made in two sections, so that they may easily be removed. The draft for cupellation is obtained through an opening about $1\frac{1}{4}$ inches in diameter made in the jacket and lining at a point opposite the hole in the rear end of the muffle, and the amount of air admitted to the muffle is controlled by a slide fitted to the jacket. An opening larger than the inlet is provided just inside of the jacket and directly over the open end of the muffle. This outlet is opened and closed by withdrawing or inserting the fire clay muffle plug. The heat rising from the crucible chamber creates by suction a draft through the full length of the muffle when the inlet and outlet apertures are open, thus securing rapid cupellation. The jacket of this furnace is made of sheet iron.

Agents for Braun Laboratory Appliances.

BRAUN COMBINATION FURNACES



No. 2154

Sectional View, Rotary Flame Combination Furnace With Cary Burner

MADE IN THREE SIZES

With each furnace is included one muffle, hood, two lengths of stovepipe and covers.

No.	40	41	42
Capacity Crucibles	10 F or 6 G	8 F or 6 G	6 F or 4 G
Muffle	6x10x4 in.	6x9x4 in.	4¾x8x3 in.
Net Weight	212 lbs.	116 lbs.	87 lbs.
Shipping Weight	252 lbs.	145 lbs.	115 lbs.
Price, complete,	\$25.00	22.50	20.00
Cary Burner recommended.....	2-inch	1¾-inch	1½-inch

RENEWAL PARTS

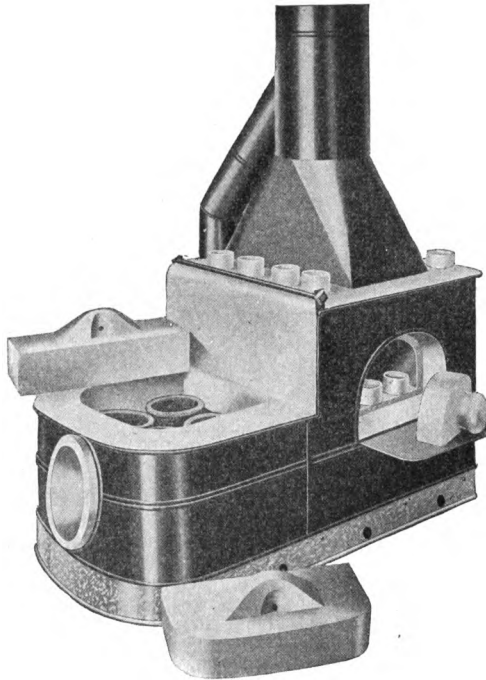
No.	40	41	42
Hood	\$ 2.00	\$ 2.00	\$1.50
Covers, per set	1.50	1.25	1.00
Burner Hole Boss .....	.25	.25	.25
Muffle Plug .....	.25	.25	.25
Dome	10.00	8.00	6.50
Side Bricks below Covers, per set of four	4.00	4.00	4.00
End Bricks, with Muffle Rests, per set of two	3.00	3.00	3.00
Deflecting Brick .....	.50	.50	.50
Jacket, Sheet Iron	7.00	6.50	6.00

Furnace Blowers. See Blowers, page 82.

Prices net F. O. B. Denver, Salt Lake, El Paso or Los Angeles.

Agents for Braun Laboratory Appliances.

CARY COMBINATION FURNACES



No. 2156

For Gas, Gasoline, Distillate or Crude Oil

The Cary Combination Furnaces are recognized as the standard the world over. A thousand users testify to their efficiency.

With each furnace is included one muffle, hood with draft attachment, two lengths stovepipe, and covers.

No.....	29	30	31
Capacity, Crucibles	2—20 gm.	4 F	6 F
Muffle.....	2½x6½x3½ in.	6x9x4 in.	7x12x4½ in.
Net Weight	42 lbs.	160 lbs.	225 lbs.
Shipping Weight	65 lbs.	220 lbs.	315 lbs.
Price, complete.....	\$15.00	\$25.00	\$27.50
Cary Burner recommended	1¼-inch	2 inch	2¼-inch

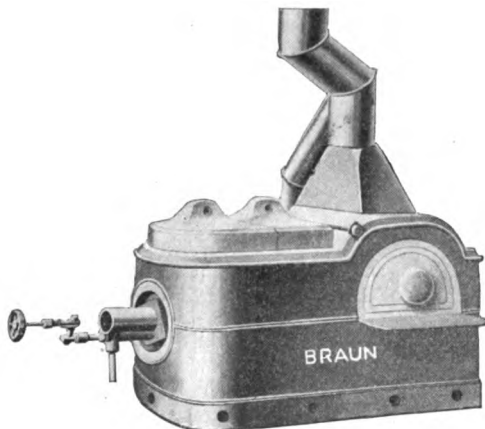
RENEWAL PARTS

No.....	29	30	31
Hood and Draft Elbow.....	\$1.25	\$2.50	\$2.50
Draft Boss.....	.25	.25	.25
Covers, per set.....	.35	1.00	1.00
Burner Hole Boss.....	.25	.25	.25
Iron Shelf.....	.25	.25	.25

Prices net F. O. B. Denver, Salt Lake, El Paso or Los Angeles.

Agents for Braun Laboratory Appliances.

L. & C. COMBINATION FURNACES



No. 2158

This furnace is intended for use with the Sunset Burner, and is mounted with a swivel in the center, allowing it to revolve so that the burner may be inserted in the burner hole at either end.

A dividing brick is furnished to be placed between the melting and muffle compartments, if but one is to be heated. We find, however, that in most cases sufficient heat is obtained in the muffle by using the burner at the crucible end to make one melt, then revolve the furnace and insert the burner at the other end. From then on the melting and cupellation may be carried on at the same time without revolving the furnace. A small trap door is placed in the bottom of the melting compartment, and in case of a spill it may be opened, the bottom knocked out, and replaced with a mixture of fire clay and sawdust.

A great objection to nearly all types of muffle furnaces, namely, that they are poor oxidizers, and for that reason cupellation is satisfactory in but a small part of the muffle, is overcome in the L. & C. and Cary Furnaces by the use of our patent draft inducing attachment. This consists of a fire clay flue connecting the muffle through a hole in the end with the pipe leading to the main flue. A damper is placed in this pipe, which may be used to choke the draft when the buttons in the cupel are opening.

L. & C. Furnaces differ from the Cary in the fact that there is a small chamber around the muffle, and also a smaller oxidizing bonnet. The burner hole is also shaped to permit the use of the Sunset Burner. For these reasons it will be seen that the Cary Burner is not entirely satisfactory when used with this type of furnace, as the flames will fire back and the products of combustion are not carried away as they should be.

No. 26, L. & C. COMBINATION FURNACE

Dimensions:

Capacity Crucible	INSIDE CRUCIBLE COMPARTMENT			Size of Muffle	Weights	
	Width	Length	Height		Net Packed	
Four F	6½ in.	6½ in.	6½ in.	6x9x4 in.	117 lb. 145 lb.	

A Sunset Burner should be used with this furnace.

2158 Price complete with one muffle, hood with draft attachment, two lengths stovepipe and covers; code name Lemon. \$25.00

RENEWAL PARTS:

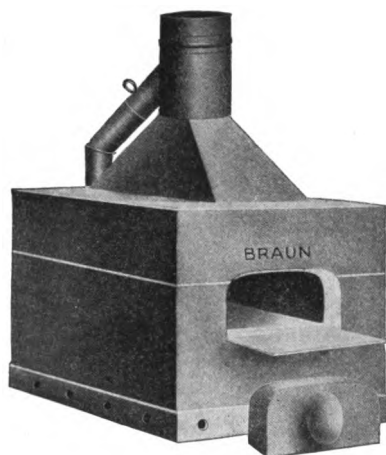
Hood and draft elbow.	\$2.50	Burner hole plug.	\$0.25
Draft boss. . . . .	.25	Iron brace with pivot. . . . .	.50
Covers, per set. . . . .	.75	Swivel plate. . . . .	.25
Dividing brick. . . . .	.25	Iron shelf. . . . .	.25

Prices net F. O. B. Denver, Salt Lake, El Paso or Los Angeles.

Agents for Braun Laboratory Appliances.

CARY MUFFLE FURNACES

No. 2160



No. 2160

Cary Furnaces Nos. 33A, 34A and 35A are fitted with a patent draft inducing attachment. This consists of a fire clay flue connecting the muffle through a hole in the end with the pipe leading to the main flue. A damper is placed in this pipe, which may be used to throttle the draft when the buttons in the cupel are opening. This insures satisfactory cupellation in all parts of the muffle. Special combustion chambers around the muffle distribute fire instead of waste heat, and produce a uniform temperature in all portions of the muffle. Furnace No. 20 is furnished with one muffle and one muffle door. Furnaces Nos. 33A, 34A and 35A are furnished with one muffle, muffle door, hood with special draft attachment, and two lengths stovepipe.

No.....	20	33A	34A	35A	36A
Muffle.....	6x12x4 in.	8x12x5¼ in.	9x15x5¾ in.	10x16x6¾ in.	14x18x7 in.
Weight, net.....	85 lbs.	185 lbs.	227 lbs.	335 lbs.	600 lbs.
Weight, packed....	120 lbs.	250 lbs.	270 lbs.	410 lbs.	675 lbs.
Price, complete....	\$17.50	\$30.00	\$35.00	\$40.00	\$60.00
Cary burner recommended.....	1½-inch	2-inch	2¼-inch	2¼-inch	2¼-inch

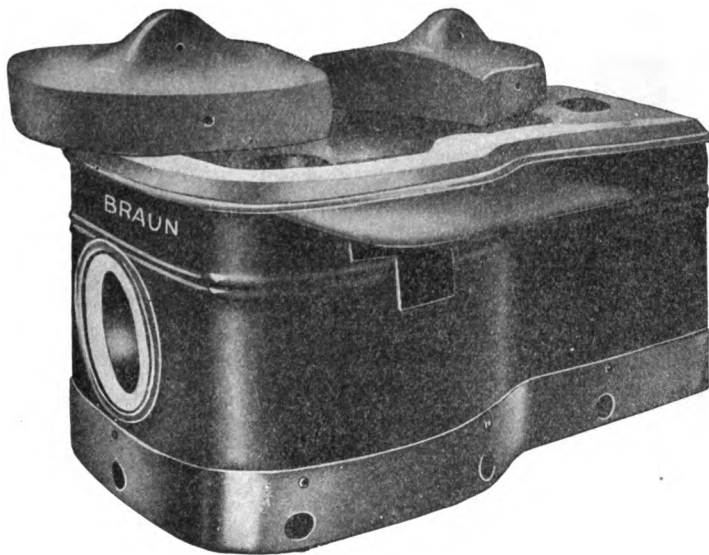
RENEWAL PARTS

No.....	20	33A	34A	35A
Hood and draft elbow.....	.....	\$3.00	\$3.50	\$3.50
Draft boss.....	.....	.25	.25	.25
Burner hole boss.....	\$0.25	.25	.25	.25
Iron shelf.....	.25	.25	.25	.25
Muffle door.....	.25	.25	.35	.50

Prices net, F. O. B. Denver, Salt Lake, El Paso or Los Angeles.

Agents for Braun Laboratory Appliances.

BRAUN CRUCIBLE FURNACES



No. 2162

No. 8 IMPROVED SHAPE CRUCIBLE FURNACE

The interior shape of this furnace is entirely different from our other types, which improvement consists of a contracted space near the outlet, wherein the two crucibles nearest the outlet deflect the flame, enabling it to better perform the work before passing out of the furnace. It can be operated with a small size Cary Burner ($1\frac{1}{2}$ -inch), which consumes less than one-half gallon of gasoline per hour, making it economical in operation. It is also provided with a removable shelf, which will be found convenient when handling hot crucibles or covers.

This type of furnace is largely used in the tin smelting industry, where it is recognized as the standard for this purpose.

Capacity	Weight, Net	Weight, Packed	Price
Six F Crucibles	80 lbs.	108 lbs.	\$20.00

$1\frac{1}{2}$ -inch Cary Burner recommended.

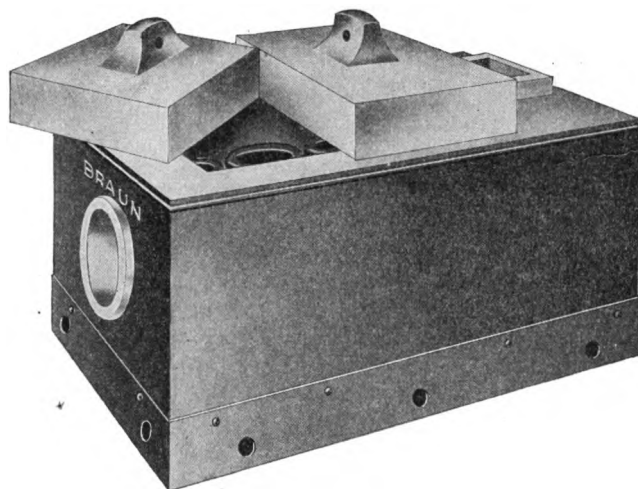
RENEWAL PARTS

Covers, per set.....	\$0.75
Burner boss .....	.25
Iron shelf.....	.25

Prices net f. o. b. Denver, Salt Lake, El Paso or Los Angeles.

Agents for Braun Laboratory Appliances.

BRAUN CRUCIBLE FURNACES



Nos. 2164-2168

SQUARE AND RECTANGULAR SHAPE CRUCIBLE FURNACES

2164 No. 3A—Rectangular Shape.

Capacity	Weight, Net	Weight, Packed	Code Name	Price
Six J crucibles	200 lbs.	240 lbs.	Date	\$25.00

2¼-inch Cary Burner recommended.

2166 No. 5—Rectangular Shape.

Capacity	Weight, Net	Weight, Packed	Code Name	Price
Eight-20-gram crucibles	72 lbs.	92 lbs.	Bass	\$17.00

1½-inch Cary Burner recommended.

2168 No. 3—Square Shape.

Capacity	Weight, Net	Weight, Packed	Code Name	Price
Four F Crucibles	63 lbs.	78 lbs.	Ash	\$15.00

1½-inch Cary Burner recommended.

RENEWAL PARTS

	No. 3 A	No. 5	No. 3
Covers, per set.....	\$1.75	\$0.50	\$0.50
Burner boss.....	.25	.25	.25
Chimney boss.....	.25		

Prices net f. o. b Denver, Salt Lake, El Paso or Los Angeles.

Agents for Braun Laboratory Appliances.

BRAUN MELTING FURNACES



No. 2170

Braun Bullion Furnaces. Especially designed for use with Cary Hydrocarbon Burners. They are arranged with a special draft outlet, being made on the same principle as a down draft furnace. The fire clay walls are very thick and substantial, and a furnace of this type will last for many years. Nos. 10, 11 and 12 require but one burner each to operate. Nos. 13 and 14 require two burners each to operate.

Cary Hydrocarbon Burners. Recommended for use with these furnaces. We are prepared to quote prices on complete equipment for using crude oil or distillate.

The prices include the furnace only, without burners, tanks, or other accessories.

BULLION FURNACES

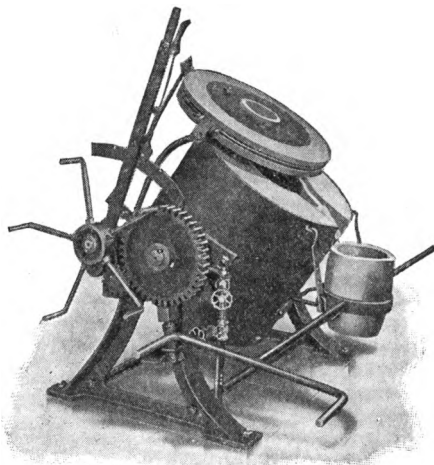
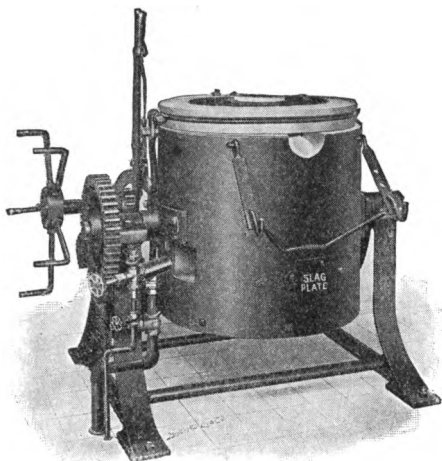
No.	10	11	12	13	14
Hold black lead crucible and cover, No.	9	25	35	80	125
Diameter	8	10	12	15	19 ins.
Depth	9½	11½	15	17½	23 ins.
Weight, net	82	147	249	366	517 lbs.
Weight, packed	111	194	325	450	650 lbs.
Price	\$14.00	22.50	30.00	40.00	60.00
Cary Burner recommended	1¾	2	2¼ (2)	2¼ (2)	2¼ ins.

Prices net F. O. B. Denver, Salt Lake, El Paso or Los Angeles.

Agents for Braun Laboratory Appliances.

CRUCIBLE MELTING FURNACES

"MONARCH STEELE HARVEY"



No. 2172

In Melting Position

Skimming and Pouring Position

2172 The most modern appliance for melting and refining ores, precious metals, cyanide precipitates, etc. Fuel: Crude oil, distillate or gas and air. Saves 50 per cent over old methods. Now in use among up-to-date ore reduction plants and brass foundries. Monarch Pressure Blowers are recommended for air pressure, see following page.

Furnished with one crucible, burner, cover, lining complete to connect to air and fuel piping, but no blower. Crucibles are straight side, full measure with large extension lip. Made by all makers and at same price as old style crucibles.

The engravings represent the latest type of portable rocker cover, which is on while metal is melting and pouring. It protects the operator from heat and retains the heat in combustion chamber.

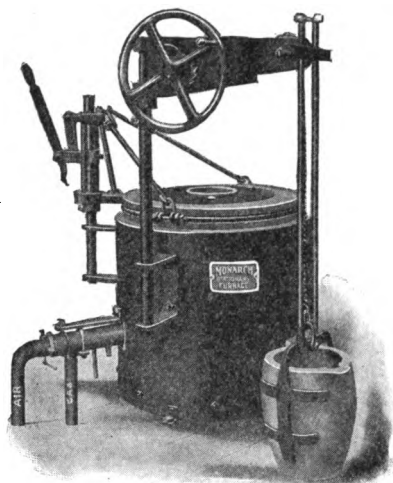
The furnace is fool-proof, protected by automatic foot-brake on tilting mechanism, under control of furnace tender at all times.

Note the swinging "Crucible or Ladle" to receive molten metal and also acts as a mixer.

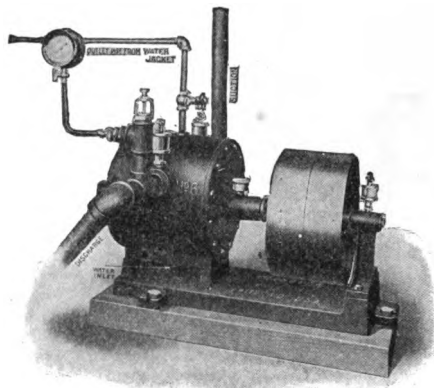
Weight Pounds	Size Crucible No.	Average Heats Brass per Day	Capacity Pounds per Heat
825	20	9 to 11	60
1700	40	8 to 10	120
1800	60	6 to 8	165
2000	125	5 to 7	350
2100	150	4 to 6	410
2900	275	3 to 4	700
3200	400	3 to 4	1100
3350	525	3 to 4	1300
3500	600	3 to 4	1500

Prices upon request.

CRUCIBLE MELTING FURNACES, ETC.



No. 2174



No. 2176

"MONARCH"

NON-TILTING FURNACES

2174 Pots lifted out and carried to moulds with or without "crane lift." This furnace is designed primarily for those who prefer to lift the crucible out with tongs, as of the old coke method, and convey the crucible to mould by shank or crane. Sometimes it is preferable to use a crucible which will hold a given quantity of metal for a certain casting, therefore the makers have patented the non-tilting furnace and guarantee the same results as obtained in the standard tilting.

DIRECTIONS

With cover swung aside fill crucible with regular charge of metal, beginning with that which requires highest melting point, same as old style coke method. Anneal crucible thoroughly and when pot is charged, put cover on firmly. See that burner flame is steady and that combustion within is perfect. The furnace is a rapid melter and will produce twice the metal of same size coke. When ready to pour, shut off air and oil or gas. Remove cover by automatic lift, turn aside, and lift crucible by tongs and carry to moulds. In order not to lose the heat in furnace, it is well to put another pot in same for annealing.

Number, Furnace.....	1	2	3	4
Size, Number, Graphite Crucible.....	40	60	125	275
Capacity (Brass)..... pounds	110	165	360	750

"MONARCH"

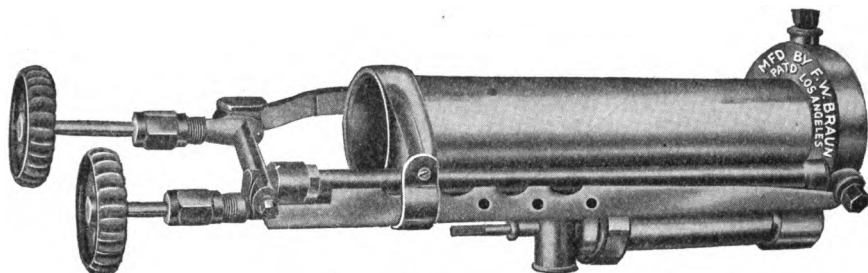
ROTARY POSITIVE PRESSURE BLOWERS

2176 These blowers are thoroughly guaranteed in operating with any type of "Monarch" Furnaces using oil and air. They run easy and are standard in all respects and are of superior workmanship. When blowers are used in connection with gas we advocate our regular volume blowers, working at 12 ounces to 3 pounds pressure.

We can also quote on the highest grade of air compressors, either belt or steam driven. Blowers furnished in seven sizes, capacity from 9 cu. ft. to 220 free air per minute.

Prices upon request.

CARY HYDROCARBON BURNERS



No. 2178

ARRANGED FOR BURNING IN ENCLOSED CHAMBERS,
SUCH AS FURNACES, Etc.

Perfect combustion requires a mixture of carbon, hydrogen, and oxygen in certain proportions, heated to the proper temperature. To obtain these results it is necessary that each individual burner may be adjusted in such a manner that a correct mixture is made. The Cary Hydro-Carbon Burner is the only one on the market with mechanical construction that admits of this adjustment, and the only one that allows no air to enter the furnace except through the mixing tube, where it is thoroughly mixed with the vaporized gasoline.

Owing to perfect combustion, the Cary Burner consumes more oxygen than other burners, and therefore the products of combustion in the shape of gases are greater. As this is the case, and as each burner is adapted in a manner to attain the most satisfactory results with no air entering the furnace except through the burner tube, it will be seen that this burner is best suited to furnaces having special burner holes and large chambers around the muffle, such as the Cary Furnace. While it may burn with other types of furnaces, it is not as satisfactory.

Perfect combustion means intense heat, and some users of the Cary Burner claim to reach the melting point of platinum. The flame is clean, gives off neither poisonous nor noxious fumes, and is almost noiseless.

Prices are net F. O. B. Denver, Salt Lake, El Paso or Los Angeles.

Agents for Braun Laboratory Appliances.

CARY HYDROCARBON BURNERS

No. 2178

The difficulties encountered in generating in other burners are overcome in this by use of a separate valve and trough. Generation is accomplished by permitting a small quantity of gasoline to flow into this trough, and igniting; the flame envelopes the burner, and quickly heats it to a temperature which admits opening the main needle valve and allowing the flame to be thrown into the furnace.

Another feature of this burner is the fact that the gasoline passes through a filter consisting of a tube having a screen at each end, and filled with clean gravel, to remove any solid matter which may be in the gasoline and prevent clogging the burner face. The gasoline passes entirely around the interior of the burner face, a feature which is found in no other assay burner except our Sunset, and which insures entire vaporization of the fuel.

The clean flame resulting from perfect combustion does not eat away or corrode the face of the burner. In this respect the Cary Burner is practically indestructible.

The size of the burner is determined by the outside diameter of the mixing tube.

FUEL CONSUMPTION

The fuel consumption of the different size Burners will vary according to the air pressure used on the oil. When from 35 to 40 pounds pressure is used the consumption will be as follows:

1¼-inch burner,	1/8 gallon per hour.
1½-inch burner,	1/2 gallon per hour.
1¾-inch burner,	3/4 gallon per hour.
2 -inch burner,	1 gallon per hour.
2¼-inch burner,	1 1/4 gallon per hour.
3 -inch burner,	2 1/4 gallon per hour.

Full and complete instructions accompany each burner sent out.

PRICES AND DIMENSIONS

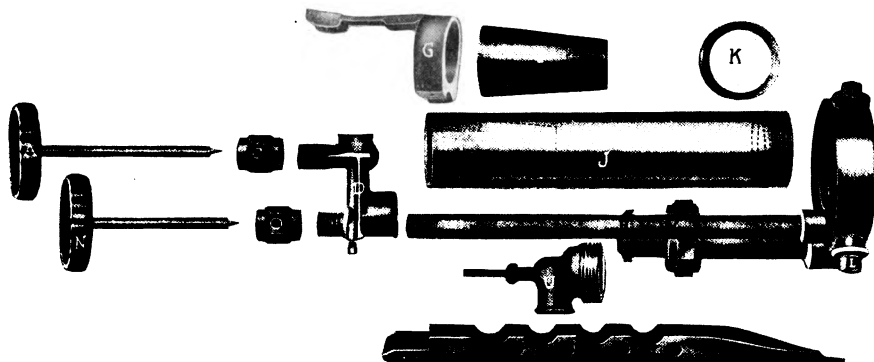
Size Ins.	Length Inches	Net Wt. Pounds	Shipping Wt. Pounds	Price
1¼	13	3 3/8	5	\$10.00
1½	13 1/2	3 7/8	5	11.00
1¾	14	4 1/8	6 1/2	12.00
2	15 1/2	4 3/4	7	13.50
2¼	17	5 5/8	7 1/2	15.00
3	23	15	18	50.00

See page 243 for Renewal parts of Cary Burners.

Prices are net F. O. B. Denver, Salt Lake, El Paso or Los Angeles.

Agents for Braun Laboratory Appliances.

CARY HYDROCARBON BURNERS



No. 2178

RENEWAL PARTS

For all sizes up to and including $2\frac{1}{4}$ inch.

A—Main Needle Valve.....	\$0.50	L—Face Screws.....	\$0.10
C—Packing Nut .....	.15	N—Generating Needle Valve.....	.50
CC—Complete Elbow and Valves, consists of A, C, D, N, O....	2.25	O—Packing Nut .....	.15
D—Elbow Casting	1.00	RVWX—Face with Feed Tube and Intake Tube brazed in	4.25
G—Collar and Brace for Mixing Tube	.75	S—Generating Trough	1.25
I—Cone inside of Mixing Tube.....	.75	U—Elbow for Gasoline Intake Tube, with Adjusting Valve	1.50
J—Mixing Tube.....	2.00	V—Union nut.....	.50
K—Retaining Ring.....	.50		

BURNER BOSS

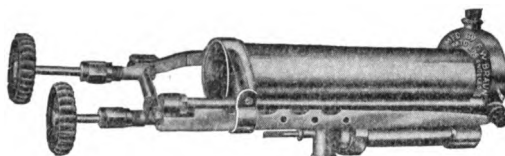
This is a fire clay boss or ring, which we furnish with all the furnaces supplied by us when it is known they are to be used with a Cary Burner. The function of this boss is to obtain a burner opening in the furnace of the correct size for the burner employed, and one which will have an even surface against which the burner may be adjusted. The reason for using the following exact dimensions is that these sizes allow the greatest possible area of the burner face to be exposed to the reflected heat from the interior of the furnace, and yet are small enough to prevent the admission of the air to the furnace, excepting that drawn through the mixing tube of the burner by the injected vapor.

	Inside Diam.	Each
Cary Burner, size $1\frac{1}{4}$ in., should have a boss.....	$2\frac{1}{2}$ in.	\$0.25
Cary Burner, size $1\frac{1}{2}$ in., should have a boss.....	$2\frac{3}{4}$ in.	.25
Cary Burner, size $1\frac{3}{4}$ in., should have a boss.....	$2\frac{7}{8}$ in.	.25
Cary Burner, size 2 in., should have a boss.....	$3\frac{1}{8}$ in.	.25
Cary Burner, size $2\frac{1}{4}$ in., should have a boss.....	$3\frac{3}{8}$ in.	.25

Prices net F. O. B. Denver, Salt Lake, El Paso or Los Angeles.

Agents for Braun Laboratory Appliances.

CARY INDUSTRIAL BURNERS



No. 2180

It is particularly recommended in mining and industrial plants

For heating pipes and rods to make bends.

For removing frozen pins and set keys.

For removing nuts without stripping the thread.

For removing corroded bolts, nuts and rivets.

For keeping a collar hot until it is in position on a shaft.

For straightening a shaft in the lathe.

For taking out dents and sags in boilers.

For straightening up a flange, or to put on a flange patch.

The Cary Industrial Burner is made in five sizes. The smallest size, $1\frac{1}{4}$ inches, which is determined by the outside diameter of the mixing tube, is recommended for very light work, while the largest size, $2\frac{1}{4}$ inches, is recommended for the heaviest kind of work and for heating large patches, as the volume of flame in the larger size is more than twice that given by the smallest.

Full and complete instructions with each burner sent out.

Size.... inches	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	*3
Each.....	\$12.00	13.00	14.50	16.00	17.50	50.00

*For cement testing a 3-inch Cary Burner, when used in connection with a special rotary kiln, will give the required heat (3000° F.), and gives perfect satisfaction. It is used by several of the largest cement works in the West and delivers a product similar to that obtained from the large kilns. These larger burners are not carried regularly in stock but are made to order only.

LARGER SIZES

We are prepared to quote on larger sizes of Cary Burners to be used for special purposes. When writing for prices give us full particulars of your requirements.

The Cary Industrial Burner embraces all of the successful points employed in the Cary Hydrocarbon Burner, but it has been slightly altered so that it will produce perfect combustion in the open air.

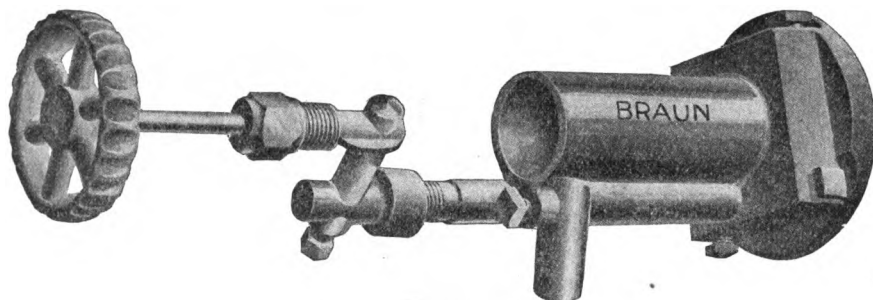
In the Cary Industrial Burner all of the parts are made heavier and consequently stronger, while an additional brace is placed around the mixing tube to prevent injury in rough usage. It is very substantially made and will stand a great deal of hard work.

The mixing tube of the burner is of such shape and size that the air is drawn into it by the jet of gas under pressure in exactly the right proportions to insure complete combustion.

The Cary Industrial Burner makes the most intense heat of any hydrocarbon burner in the world, developing from fifty to seventy-five per cent more heat than others, and at a less expenditure for fuel.

The greatest economy in using the Cary Industrial Burner is on objects where, without this burner, you would have to take down a machine and carry it to the forge. With this burner you carry the forge to the work, and your fire is hotter, more intense, and under better control than in any other forge or furnace fire.

SUNSET HYDROCARBON BURNER



No. 2182

SUNSET HYDROCARBON BURNER

This burner is constructed for those who desire an efficient yet low-priced burner. It will be found to do entirely satisfactory work, and next to the Cary, is the best gasoline burner on the market.

As in the Cary Burner, the gasoline is forced around the interior of the burner face, which insures its being thoroughly vaporized before leaving the needle valve. The metal used in its construction is a special alloy, which is quickly heated and does not chip off, as is usually the case with other burners. With this burner a certain amount of air should be drawn into the furnace around the burner face, as sufficient air does not enter through the mixing tube, as in the Cary Burner. It will be seen at once that this makes it entirely different in operation from the Cary Burner, and another difference is the fact that it may be used with a furnace having smaller space around the muffle.

While the combustion is as nearly perfect as can be obtained with a burner where it is impossible to adjust all parts, the flame is not as hot as that obtained with the Cary Burner, but it will be found ample for assaying purposes.

Full and complete instructions accompany each burner sent out.

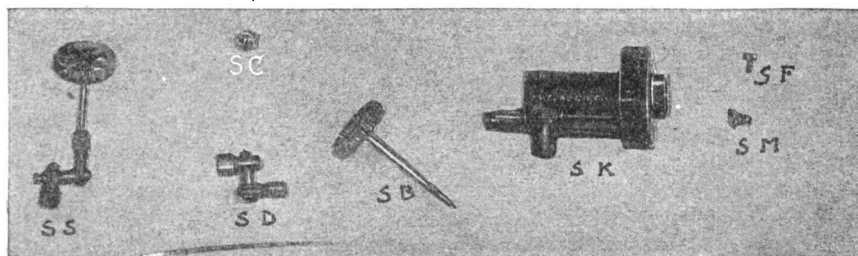
Length, 10 inches.

Greatest diameter, $3\frac{1}{2}$ inches.

Net weight, $2\frac{7}{8}$ lbs.

Shipping weight, $3\frac{1}{2}$ lbs.

Price..... \$4.00



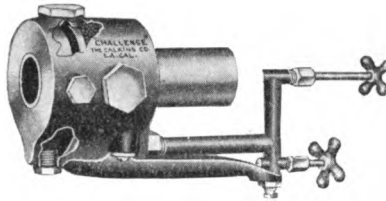
RENEWAL PARTS FOR SUNSET BURNER

S B	Needle Valve	\$0.50
S C	Nut for Needle Valve.....	.15
S D	Elbow.....	1.00
S F	Sealing Screw.....	.10
S S	Complete Elbow and Valve (consists of S B, S C, S D, S F)	1.75
S K	Burner Casting.....	3.00
S M	Face Screw.....	.10

Prices are net f. o. b. Denver, Salt Lake, El Paso, or Los Angeles.

Agents for Braun Laboratory Appliances.

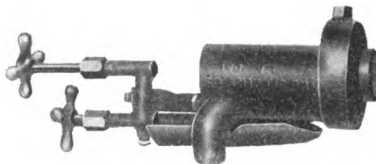
GASOLINE BURNERS



No. 2184

2184 Challenge Hydrocarbon Burner. This burner is practically indestructible, the main part of the burner consisting of one single copper casting. A straining and generating chamber filled with small gravel extends entirely around and along the combustion tube for half its length. The gasoline is admitted to this chamber at a point near the under side of the burner and farthest from the face of the burner. There is an annular duct at the face of the burner connected with the gravel chamber at the upper side of the burner and having an outlet at its lowest point into the duct which leads to the jets of the burner. This burner is provided with a sub-jet and a generating trough leading along under the burner from the sub-jet to the face of the burner. When the burner is once heated properly to the generating point, the sub-jet is to be closed.

Price \$12.50



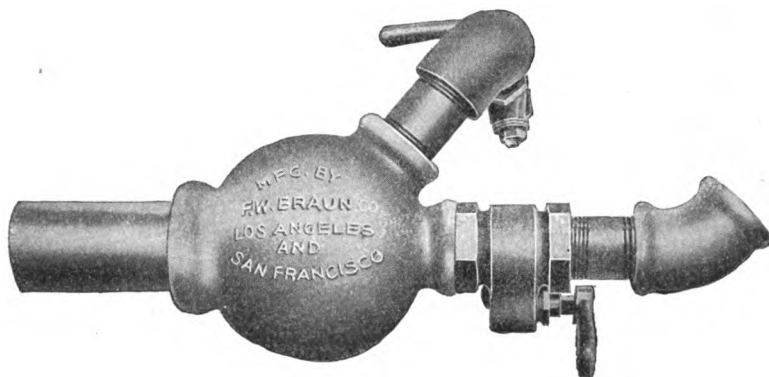
No. 2186

2186 "Advance" Hydrocarbon Burners. The acme of efficiency and simplicity; one solid casting; no parts to work loose and twist out of alignment; equipped with an auxiliary generating device; is beyond question or doubt the best assayers' burner on the market.

The "Advance" Hydrocarbon Burner was designed with a view to giving the purchaser a strong and efficient assay furnace burner of simple construction and at a low cost. It is without a peer for assayers' use, and has replaced many higher priced flimsily-constructed burners.

Price \$5.00

BRAUN GAS BURNER



No. 2188

FOR USE WITH ORDINARY ILLUMINATING OR FUEL GAS

There are many places where it is desirable to use illuminating or fuel gas in preference to liquid fuel, and to supply this demand the Braun Gas Burner has been designed, which permits the use of gas for assaying and melting purposes in an entirely satisfactory manner.

The construction of the burner is such that air and gas are properly mixed in right proportions after the recognized principles of Bunsen.

To obtain a sufficient amount of air for this burner it is necessary to employ a blower, which may be operated by electricity or any other available power.

We furnish blowers which will supply sufficient air for from one to three burners, that can be operated with belt power or can be attached to a small electric motor. These require about $\frac{1}{8}$ horse power to operate.

The simplicity of this outfit will be appreciated when it is considered that a mere striking of a match and opening of valves controlling gas and air places the outfit in instantaneous operation.

Although this burner is described in connection with Combination Furnace No. 40, it can be arranged to operate any of our furnaces. Best results are obtained from $\frac{3}{4}$ -inch gas supply pipe.

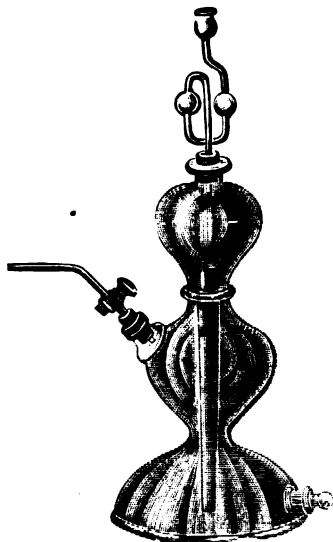
Weights (burner only): Net weight, 12 lbs. Shipping weight, 18 lbs.

Price (including air and gas valves).....\$15.00

Prices are net F. O. B. Denver, Salt Lake, El Paso or Los Angeles.

Agents for Braun Laboratory Appliances.

GAS APPARATUS



No. 2190

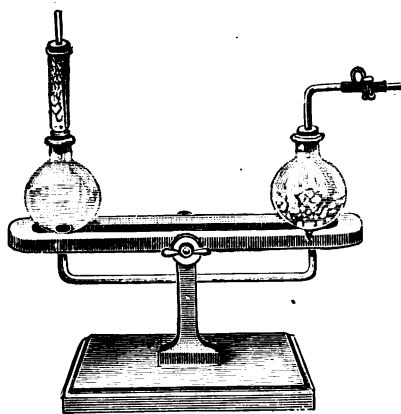


No. 2192

2190 Sulphuretted Hydrogen Generator, Kipp's Form.

Size	½ pt.	1 pt.	1 qt.	½ gal.	1 gal
Each	\$3.50	4.00	5.00	6.50	9.00

2192 Sulphuretted Hydrogen Generator, Colorado Form. Quart size, giving constant supply..... \$1.50



No. 2194

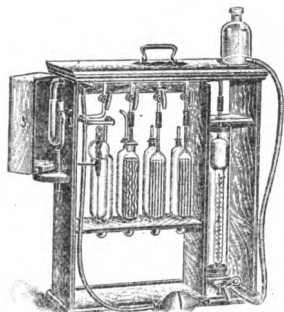
2194 Sulphuretted Hydrogen, Generator, Babo's Form.

Very handy where a frequent supply of small quantities of H_2S is needed; complete, mounted on improved stand, with rubber stoppers, pinch-cocks and delivery tube.

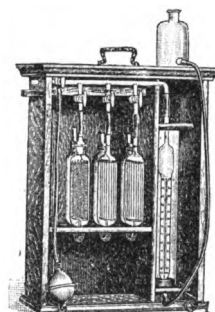
Price, each	\$2.75
Price, semi-circular tube, only	1.25

Gases Compressed in Cylinders. Ammonia (anhydrous), carbonic acid liquefied, chloride gas liquefied, hydrogen gas compressed, oxygen gas compressed. Prices on application.

GAS ANALYSIS APPARATUS



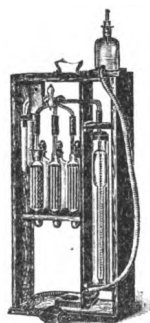
No. 2196



No. 2198

2196	Gas Apparatus — Orsat-Lunge's, for flue and furnace gases, for analysis of CO_2 , CO, O and H, consisting of four absorption pipettes, tube with 5 stop-cocks. Gas Measuring Tube with water jacket and aspirator bottle, in portable wooden case.	\$34.00
2198	Gas Apparatus — Orsat-Muencke's, for flue and furnace gases, for analysis of CO_2 , CO and O, consisting of three absorption pipettes, tube with four stop-cocks. Gas Measuring Tube with water jacket and aspirator bottle, in portable wooden case.	\$25.00
2200	Gas Apparatus — Orsat-Fischers, A modification of the Orsat-Muencke Apparatus, small size, very handy for traveling.	\$25.00
	Complete in wooden case.	\$25.00
	Separate Parts for No. 2196.	
	Measuring Tubes for any of the above.	\$4.00
	Tube with 5 stop-cocks for No. 2196.	8.00
	Tube with 4 stop-cocks for No. 2198.	7.00
	Pipettes, filled with Glass Tubes and Copper Spirals, with ground in Glass Stopper.	3.50
	Pipettes, filled with Glass Tubes.	2.50
	Pipettes, Plain.	2.25
	Soft Rubber Bags, for attaching to Orsat Pipettes. ....	.50
	Aspirator Bulbs of Rubber with two valves for same, and Rubber Connections. ....	.75
	Aspirator Bottles. ....	.45

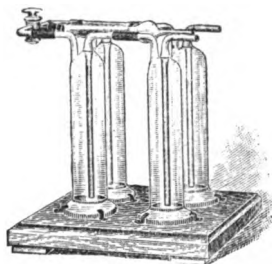
N. B.—The above prices are for parts which fit the apparatus which we handle. Special sizes can be made to order at reasonable prices. Always state apparatus wanted for, sending in broken piece when possible.



No. 2202

2202	Gas Apparatus—Orsat-Muencke's, Petrzilka modification, with large universal stop-cock, dispensing with four smaller ones, in portable case.	\$35.00
2204	Extra stop-cocks for above.	12.00

GAS APPARATUS



No. 2206



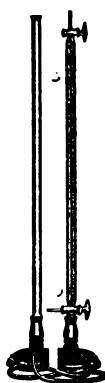
No. 2208

- 2206 Gas Drying Apparatus, Bennert's. Consisting of four cylinders, with sealed-in tubes, mounted in brass cups on wooden board..... \$10.00
- 2208 Gas Drying Apparatus, Glaser's. For drying and washing of gases..... 9.00

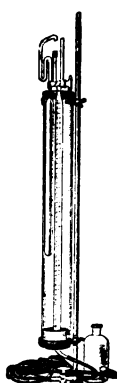
GAS BURETTES



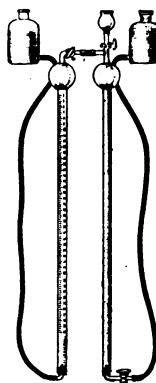
No. 2210



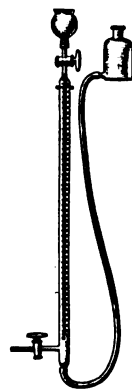
No. 2212



No. 2214



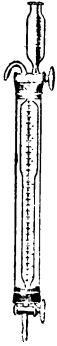
No. 2216



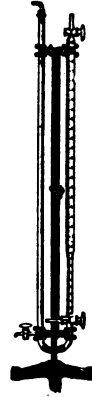
No. 2218

- 2210 Gas Burettes, Hempel's. With heavy bases.
Complete, per pair..... 5.00
- 2212 Gas Burettes, Hempel's. With glass stopcocks and heavy bases.
Per pair..... 7.50
- 2214 Gas Burettes, Hempel's. Arranged for temperature and barometric correction, complete as shown in engraving..... 12.50
Glass parts, only..... 9.00
- 2216 Gas Burettes, Elliot's. Especially adapted to analysis of furnace and illuminating gases. Complete with reservoir and rubber connections, as shown in illustration..... 12.50
The two burette parts, only..... 10.00
- 2218 Gas Burettes. The explosion burette, extra, each..... 6.00

GAS BURETTES



No. 2220

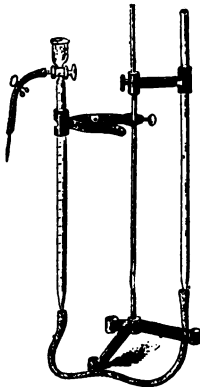


No. 2224

2220	Gas Burettes, Bunte's.	With 2 stopcocks and water jacket, each	\$7.50
2222	Gas Burettes, Bunte's.	Same as above, without water jacket, each	6.00
2224	Gas Burettes, Winkler's.	Measuring tube divided in $\frac{1}{4}$ ths, and its lower part in 1-20 cc. with fitting and support complete, each	12.00
		Measuring tube and filling tube only, each	8.00
		Measuring tube only, each	6.25



No. 2226



No. 2228



No. 2230



No. 2232

2226	Gas Burettes, Thoerner's.	Complete on wooden support, each	6.75
2228	Gas Burettes, Lunge's.	Capacity, 50 cc., without support, each	4.00
2230	Gas Measuring Tubes, Bunsen's.		
	Capacity.....cc.	25 50 100 200 300	
	Grad.....	1-5 1-5 $\frac{1}{2}$ 1-1 1-10	
	Price.....each	\$0.60 1.00 1.30 1.60 2.50	
2232	Gas Measuring Tubes, Bunsen's.	With stopcock.	
	Capacity.....cc.	50 100	
	Grad.....	1-10 1-5	
	Price.....each	\$2.00 2.50	

GAS MEASURING TUBES, ETC.



No. 2234

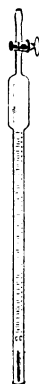


No. 2236

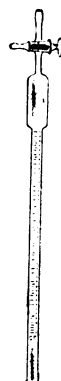
2234	Gas Eudiometers, Bunsen's. With platinum electrodes.								
	Capacity.....	300	500	700	800 mm.	50	100 cc.		
	Price.....each	\$1.60	2.00	2.50	3.00	1.80	2.25		
2236	Gas Eudiometers, Mitscherlich's. With stopcocks and platinum electrodes.								
	Capacity					50	100		
	Grad.....					1-5	1-50		
	Price.....each					\$3.00	3.50		



No. 2238



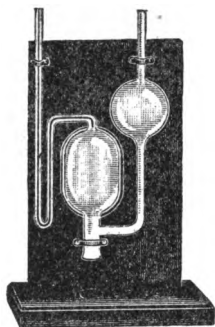
No. 2240



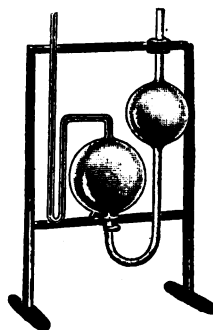
No. 2242

2238	Gas Eudiometers, Ure's. U form, with platinum electrodes.....	\$2.25
2240	Gasometer Tubes, Baird's. With 2-way stopcock, capacity, 100 cc., graduated to 48 cc.....	2.50
2242	Gasometer Tubes, Mendelson's. With 3-way stopcock, capacity, 100 cc., Graduated to 48 cc.....	3.00

GAS PIPETTES

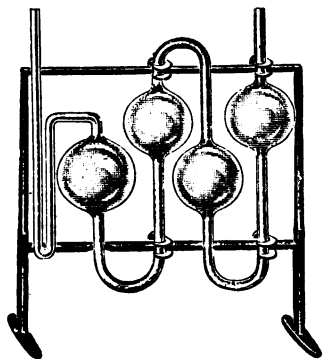


No. 2244
FOR SOLIDS

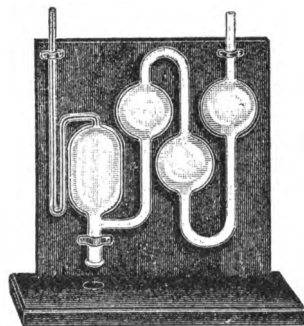


No. 2246
FOR LIQUIDS

2244	Gas Pipettes, Hempel's.	Absorption, simple, for solids, mounted	\$3.00
	Glass part, only		1.50
2246	Gas Pipettes, Hempel's.	Absorption, simple, for liquids, mounted.....	3.00
	Glass part, only		1.50



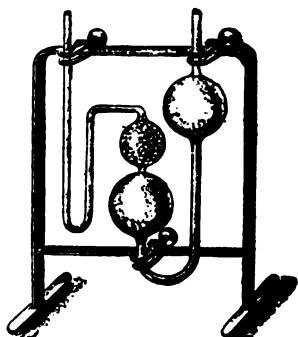
No. 2248
FOR LIQUIDS



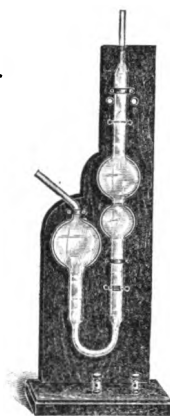
No. 2250
FOR SOLIDS

2248	Gas Pipettes, Hempel's.	Absorption, compound, for liquids, mounted	4.00
	Glass part, only		2.25
2250	Gas Pipettes, Hempel's.	Absorption, compound, for solids, mounted	4.00
	Glass part, only		2.25

GAS PIPETTES

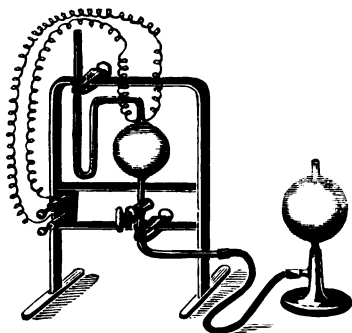


No. 2252

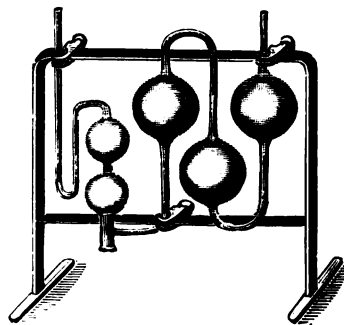


No. 2254

2252	Gas Pipettes, Hempel's, Ethylene, Bulb filled with Glass Beads.	
	Price, Mounted	\$4.00
	Price, Glass Part, only	2.25
2254	Gas Pipettes, Hempel's, Explosion, New Form, with Electrodes for Generation of Hand O, mounted on Wooden Support	6.50
	Price, Glass Part, only	4.00



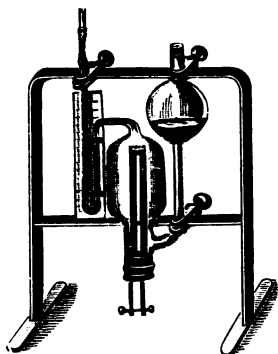
No. 2256



No. 2258

2256	Gas Pipettes, Hempel's, Explosion, with Leveling Bulb	\$6.50
	Price, Glass Part, only	4.00
2258	Gas Pipettes, Hempel's, Hydrogen, mounted	5.00
	Price, Glass Part, only	2.75

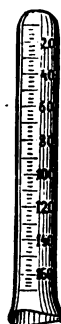
GAS PIPETTES, ETC.



No. 2260



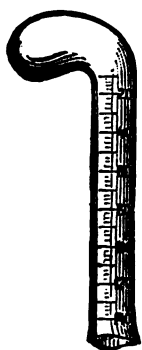
No. 2262



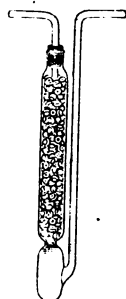
No. 2264

2260	Gas Pipettes, Hempel's, for Estimation of Methane, with Platinum Spiral.	
	Price	each \$6.00
	Price, Glass Part, only	2.50
2262	Hempel's Palladium Tube, for Absorption; filled with Palladium Black	2.50
2264	Gas Absorption Tube, Bunsen's, Straight, Graduated	1.00

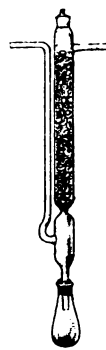
GAS ABSORPTION TUBES



No. 2266



No. 2268



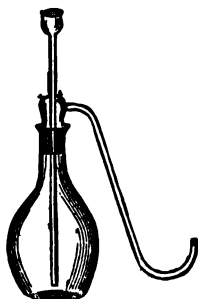
No. 2270

2266	Gas Absorption Tube, Bunsen's, with Bulb, Graduated	\$1.25
2268	Gas Absorption Tube, Babo's, filled with Glass Beads	1.25
2270	Gas Absorption Tube, Emmerling's, filled with Glass Beads	1.50

GAS GENERATORS



No. 2272



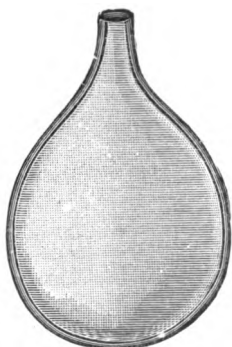
No. 2274



No. 2276

- 2272 Gas Generator. Consisting of flask, funnel tube, and delivery tube.
 Pint size.....each \$0.60
- 2274 Gas Generator. As above, with tubes ground into the neck.
 Pint size.....each 1.00
- 2276 Gas Generator. Consisting of generating bottle, funnel tube, lead basket
 and delivery tube with pinch-cock. Quart size.....each 2.00

GAS BAGS AND HOLDERS



No. 2278



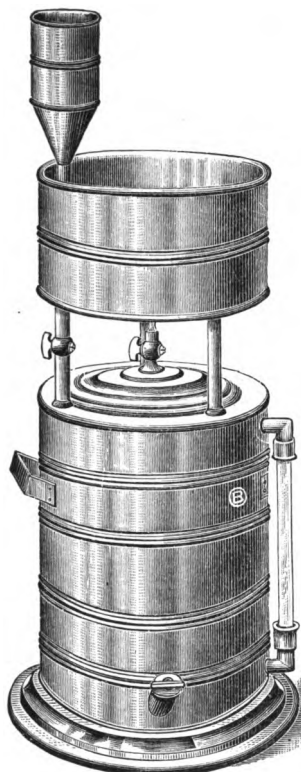
No. 2282



No. 2284

- 2278 Gas Bags. Of best rubber, oval.
 Capacity.....gals. 1 2 3 5
 Each.....\$1.75 2.25 3.00 4.00
- 2280 Brass Nozzle and Stopcock. For any bageach.. \$1.25
- 2282 Gas Holder, Berzelius's. Entirely of glass, capacity, 1 gallon.....each 9.00
- 2284 Gas Holder, Mitscherlich's. Of glass with brass fittings, capacity, 3 gal-
 lons.....each 20.00

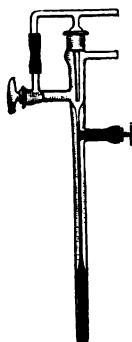
GAS HOLDERS AND REGULATORS



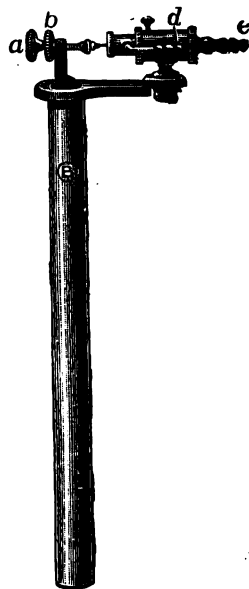
No. 2290



No. 2286



No. 2294



No. 2296

2286	Gas Collecting Tubes. With stopcock at each end. Capacity about, 250 cc., each	\$3.00
2288	Gas Distributors. With four stopcocks and center light	4.00
2290	Gas Holder, Pepy's. Of heavy zinc, improved form, capacity, 10 gals	20.00
2292	Gas Regulator, Reichert's	2.50
2294	Gas Regulator, Reichert's. With stopcock	4.00
2296	Gas Regulator. According to Roux, without the use of mercury or glass in its construction. Made in two sizes.	
	Small size, 10 inches	8.00
	Large size, 12 inches	10.00
2298	Gas Regulator, Greenman's. Made entirely of steel (a special feature). Each	12.50

GAS COLLECTING TUBES, ETC.



No. 2300



No. 2302

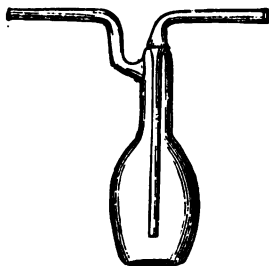


No. 2304

2300	Gas Collecting Tubes, with Bulb, Stop-Cock at each end	\$3.00
2302	Gas Pressure Regulator, Murrill's, latest and most convenient form, for use with a Thermostat.....	8.00
2304	Gas Washing Bottles, Allihn's, capacity, 500 c.c.	1.75



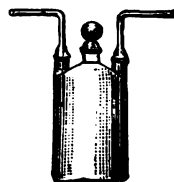
No. 2306



No. 2308



No. 2310



No. 2312

2306	Gas Washing Bottles, Bunsen's, with tube and rubber connections.			
	Size.....inches	7	9	
	Price.....each	\$0.60	.75	
2308	Gas Washing Bottles, Cloez's.			
	Capacity.....ounces	8	16	
	Price.....each	\$1.00	1.25	
2310	Gas Washing Bottles, Dreschel's, with tubes ground in neck.			
	Capacity.....ounces	8	16	
	Price.....each	\$1.00	1.25	
2312	Gas Washing Bottles, with two tubes ground into neck and glass stopper.			
	Capacity.....grms.	125	250	500
	Price.....each	\$1.00	1.25	1.50

GASOLINE TORCHES



No. 2314

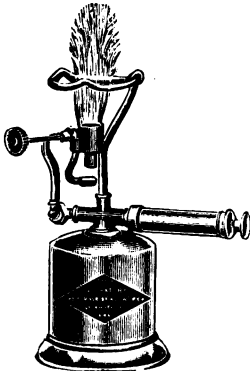


No. 2316

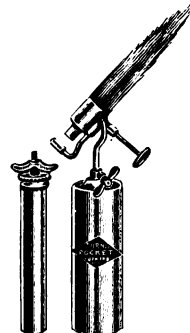


No. 2318

- 2314 Pint Size, No. 38. With hook and support on the burner tube. Produces a strong blue flame. \$3.50
- 2316 Quart Size, No. 32. Same as above, but, with larger capacity, with hook and support on the burner tube. 4.00
- 2318 Pint Size, No. 48. Fitted with a special burner, which is light, yet sufficiently powerful to generate a flame adapted to all requirements. The pump is automatic. 4.00



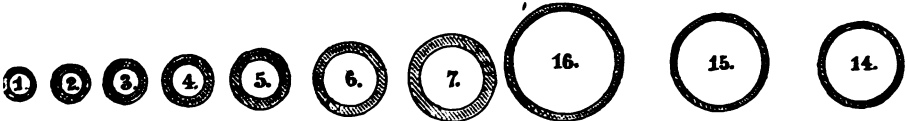
No. 2320



No. 2322

- 2320 Laboratory Torch. "Light with a match;" makes its own gas. It is a small tool, the tank or reservoir being of one pint capacity, very neat and compact. The burner, which generates a clear blue flame, is swiveled in such a manner that the flame can be raised or lowered, or pointed in almost any direction. 5.50
- 2322 Pocket Torch. "Light with a match;" makes its own gas. This torch is the smallest which can be constructed and gives perfect service. Will burn about one hour with one filling. 2.75

GLASS TUBING



No. 2324

No. 2326

Best German glass, free of lead, made expressly for chemical use, for glass-blowing and fitting up chemical apparatus, strong and elastic.

In lengths of 5 feet.

2324 Glass Tubing. Medium wall.

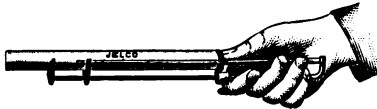
Size 3 to 20 mm. external diameter.....lb.	\$0.50
Size 21 to 50 mm. external diameter.....lb.	.60
Size 51 to 65 mm. external diameter.....lb.	.75

2326 Glass Tubing, Light Wall. Same prices as medium wall.

2328 Glass Tubing, Barometer. From 7 to 10 mm. external diameter.....lb.	.75
2330 Glass Tubing, Capillary. From 2.5 to 5 mm. external diameter.....lb.	1.00
2332 Glass Tubing, Combustion. Hard Jena Glass.....lb.	.75
2334 Glass Tubing, Combustion. Small sizes for blow piping and Marsh's Arsenic Test.....lb.	1.00
2336 Glass Tubing, Gauge. Well annealed, from 6 to 20 mm. external diameter.....lb.	.75
2338 Glass Tubing, Gauge. Cut in any length to order.....lb.	1.00



No. 2342



No. 2344



No. 2346

2340 Glass Beads. Solid. for surface—extending medium in absorptions. Per lb.	1.20
2342 Glass Cutter. For tubing, Griffin's, nickel-plated brass.....	1.00
Extra steel wheels.....	.20
2344 Glass Cutter. For tubing, will cut any length up to 10 in.....	1.25
2346 Glass Cutter. Steel wheel, for plates.....	.25
2348 Glass Plates. Square, heavy, plate-glass, ground on one side. Size.....in. sq. 3 4 5 6 8 10 12 15 20 Each.....	\$0.10 .15 .20 .25 .40 .60 1.00 1.50 2.50
2350 Glass Plates. Square, light, ground on one side. Size.....in. sq. 2 3 4 5 6 8 10 12 Each.....	\$0.03 .04 .05 .07 .10 .15 .25 .30
2352 Glass Plates. Square, blue colored glass. Size.....inches 2x2 3x3 4x4 5x5 6x6 Each.....	\$0.05 .06 .08 .12 .15
Glass Wool. See Chemical list, page 492.	

GLOVES AND GOGGLES

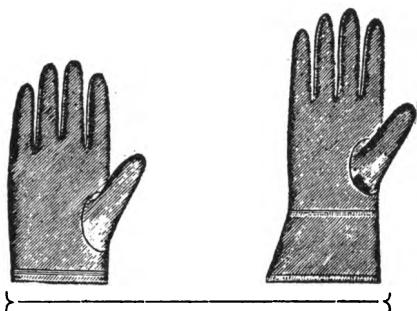


No. 2354



No. 2356

- 2354 Gloves, Asbestos. With thumb and finger, pair \$3.00
 2356 Gloves, Asbestos. Mittens, pair 2.50



No. 2358



No. 2360

- 2358 Gloves, Black Rubber. Acid-proof, for protecting the hands in handling acids, nitrate of silver, etc.
 Size..... Short Half long Short Half long Heavy driven
 No..... 10 to 12 10 to 12 13 13 13
 Gauntlet..... None 4 in. None 4 in. 5 in.
 Pair..... \$1.25 1.50 1.40 1.65 2.00
- 2360 Gloves, White Rubber. For smelters, in use in chlorination and cyanide works, etc. No. 13 with 9-inch gauntlet..... \$3.50
- 2362 Gloves, White Rubber. No. 13, 21-inch gauntlet 6.00



No. 2366

- 2364 Goggles. For protecting the eyes, colored glass, pair15
 2366 Goggles, Covers'. Made of a single piece of pure rubber; will fit anybody; air tight 1.50

GOLD WASHING PANS



Nos. 2368-2372



No. 2374

2368 Miners' Gold Washing Pans, Aluminum.

Diameter.....	inches	12	16
Depth.....	inches	2	2½
Each.....		\$1.25	2.00

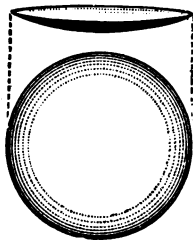
2370 Miners' Gold Washing Pans, Copper.

Diameter.....	inches	12	16
Depth.....	inches	2	2½
Each.....		\$2.00	2.50

2372 Miners' Gold Washing Pans, Polished Steel.

Diameter.....	inches	12	16
Depth.....	inches	2	2½
Each.....		\$0.40	.50

2374 Miners' Gold Washing Pans, Steel. With copper bottom, 16 inches diameter, 2½ inches deep..... \$3.00



No. 2376

2376 Gold Pans, Richard's. Vanning plaque, of enameled iron..... 1.00

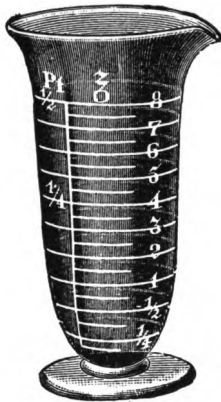


Nos. 2378-2386

2378 Gold Washing Horns, Miners'. Of plain horn, unpolished, best quality.

Each.....		.75
2380 Gold Washing Horns.	Of black polished buffalo horn	1.00
2382 Gold Washing Horns.	Of hard rubber, black.....	.75
2384 Gold Washing Horns.	Of copper.....	1.00
2386 Gold Washing Horns.	Of steel, polished.....	.40

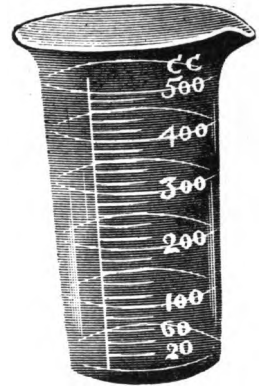
GRADUATES



No. 2390



No. 2392



No. 2398

2388 Graduates, Glass. Cone shape. Guaranteed accurate.

Capacity.....	drams	1	2
Capacity.....	minims	60	120
Each.....		\$0.20	.20

2390 Graduates, Glass. Graduation in ounces.

Capacity.....	ounces	$\frac{1}{2}$	1	2	4	8	16	32
Each.....		\$0.15	.15	.18	.25	.35	.55	.85

2392 Graduates, Glass. Conical, graduation in grammes.

Capacity.....	grammes	25	50	100	150	200	250	500	1000
Each.....		\$0.35	.40	.50	.55	.65	.75	1.00	1.65

2394 Graduates, Glass. Double graduation, in grammes and ounces.

Capacity.....	ounces	1	2	4	8	16	32
Capacity.....	grammes	30	60	125	250	500	1000
Each.....		\$0.30	.40	.60	.80	1.20	2.00

2396 Graduates, Glass. Beaker form, flat bottom, graduated in ounces.

Capacity.....	ounces	1	2	4	8	16	32
Each.....		\$0.20	.25	.30	.35	.50	1.00

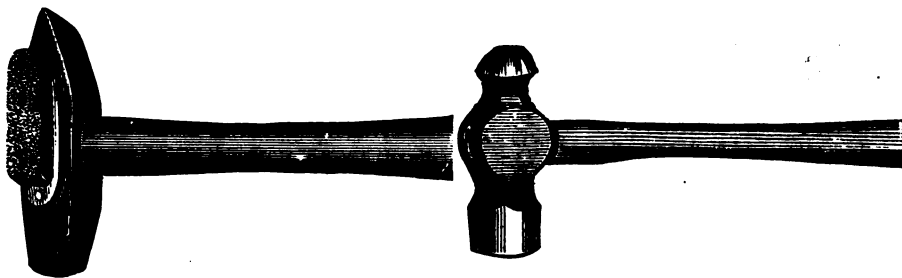
2398 Graduates, Glass. Beaker form, flat bottom, graduated in cubic centimeters.

Capacity.....	cc.	30	60	120	250	500	1000
Each.....		\$0.25	.30	.35	.40	.60	1.20

Graduated Cylinders. See Cylinders, page 172.

Grinders. See Crushers, pages 150-165.

HAMMERS



No. 2400

No. 2404

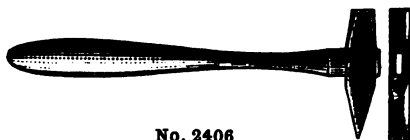
2400 Hammers, Donaldson's. Same as slagging hammer, for cleaning slag anvil, with brush $2\frac{1}{4} \times \frac{1}{2}$ inch, attached to one side by screws.

Weight.....oz.	16	19	34
Each.....	\$1.25	1.50	1.75

2402 Hammers. Extra brushes for aboveeach \$0.50

2404 Hammers. Ball Pein. Best cast steel.

Weight.....oz.	12	16
Each.....	\$0.75	1.00



No. 2406

2406 Hammers, Slagging. Of superior cast steel.

Weight.....oz.	7	12	15	18	22
Each.....	\$0.50	.55	.55	.60	.70



No. 2408



No. 2412

2408 Hammers, Blow Pipe, Plattner's.

Nickel-plated, with wire handle.....each \$0.60

2410 Hammers, Striking. For breaking up large samples, double-poleeach 1.00

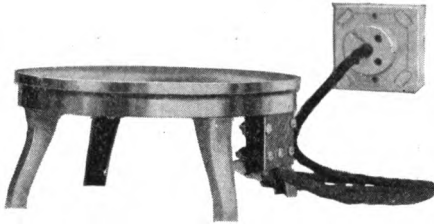
2412 Hammers, Prospecting Picks.

Pick length.....inches	7	8
Each.....	\$1.25	1.40

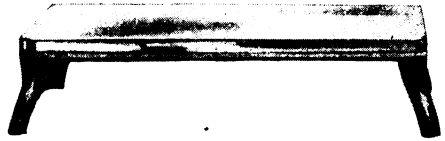
Hose Connections. See page 353, Nos. 3166-3170.

HOT PLATES

ELECTRIC LABORATORY PLATES



Nos. 2414-2418



Nos. 2420-2430

These plates are specially designed and adapted for use in the laboratory, and are extensively used by mining companies, chemical companies, and in the laboratories of steel works and other industrial plants. They are used for heating sand baths, etc.

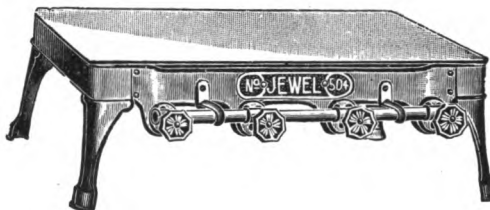
The surface of the plate heats to about 600° F., depending upon the watt consumption, length of time the current is turned on and the amount of work it is called upon to perform. The plates are of cast iron with a finely polished planed surface, and are made in various sizes, as listed below. They are equipped with the new steel-clad heating elements, directly attached. They are light, durable and quick heating.

No.	Diam., In.	Max. Watts	Heat Reg.	Weight, Lbs.	Price
2414	8	800	3	10	\$11.00
2416	10	1100	3	14	13.00
2418	12	1500	3	28	15.00

Voltages, 95-104, 105-114, 115-125, 190-209, 210-229, 230-250.

No.	Width	Length	Max. Watts	Heat Reg.	Weight	Price
2420	7	11	800	3	14	\$12.50
2422	9	18	1200	3	32	21.00
2424	12	18	1500	3	38	26.00
2426	12	24	1700	3	50	32.00
2428	18	24	2600	3	78	42.50
2430	18	30	3300	3	100	55.00

Voltages, 100-107, 108-113, 114-119, 120-125, 210-220, 221-230, 231-240, 241-250.



Nos. 2432-2434

2432	Hot Plate.	For use with gas, giving even temperature to all parts of the plate.
	Size.....	in. 18x14 18x22 18x30
	Each.....	\$10.00 15.00 20.00
2434	Same as	above, for gasoline gas.
	Size.....	in. 10x18 14x18 18x25 18x36
	Each.....	\$8.50 12.00 19.00 27.50

HYDROMETERS IN GENERAL

A Hydrometer is an instrument used to determine the relative densities of liquids.

Pure water at a temperature of 60° F. is the standard of comparison.

A scientific Hydrometer scale uses this standard of comparison for the initial point of the scale, and graduates decimally above and below this initial point to compare liquids heavier or lighter than water.

This scale is called the specific gravity scale and the initial point is marked 1.000.

For example, a liquid whose density is 50 per cent greater than water would read 1.500 upon such a scale, and one whose density is 25 per cent lighter than water would read .750.

To place upon one Hydrometer, a scale covering these maximum ranges would make the instrument (if of reasonable size) too sluggish for practical use; hence these limits are covered upon a series of Hydrometer stems, placing more degrees upon the less delicate and less degrees upon the more refined ones.

Comparatively few Hydrometers are scaled with the specific gravity scale.

Most of them have arbitrary scales, note Beaumé, Brix, Balling and a hundred minor ones.

It is fair to assume that the multiplicity of Hydrometer scales has arisen because original investigators found that it suited their convenience to divide the stems of their Hydrometers in other than the specific gravity divisions, and their influence (note Brix and Balling upon sugar) has been strong enough to continue the use of their arbitrary scales.

The chaos is caused by the fact that the originators of these arbitrary scales left no clear and definite statement of the methods whereby they arrived at their scale values or their specific gravity equivalents.

Their general methods are known, but the niceties that constitute standard conditions were not observed (no doubt they could not be at that time) and to-day each civilized country possessing a Bureau of Standards gives its own value in specific gravity degrees to the arbitrary standard Hydrometer scales. (This is particularly noticeable in the Beaumé).

If of one of the less known scales, we find that custom has fixed upon one value to a greater extent than upon another, we accordingly supply the scale as the majority of interests have determined, but we do so knowing that there are in use other arbitrary scales bearing the same name but of different specific gravity value.

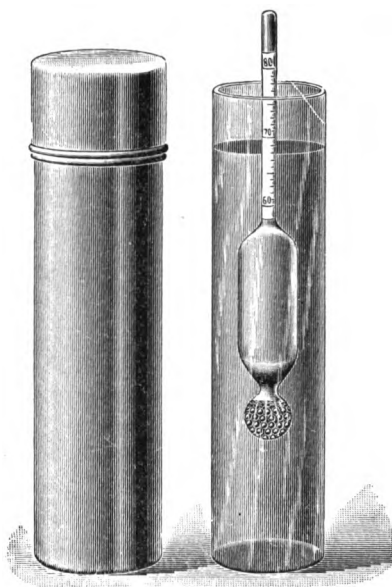
HYDROMETERS



No. 2436
ACID AND HEAVY
LIQUIDS



No. 2456
ROUND BATTERY
HYDROMETER



No. 2468
HYDROMETER WITH TEST JAR
IN NICKEL CASE

2436	Hydrometers. Acid and heavy liquids, Beaumé, 0 to 70 in 1-1°.	Ordinary grade	\$0.40
2438	Hydrometers. Acid and heavy liquids, Beaumé, 0 to 70 in 1-1°.	Medium grade .....	.50
2440	Hydrometers. Acid, Beaumé, 0 to 30 in 1/2° .....		.75
2442	Hydrometers. Acid, Beaumé, 30 to 60 in 1/2° .....		.75
2444	Hydrometers. Acid, Beaumé, 60 to 70 in 1-10°.	Standard grade	1.50
2446	Hydrometers. Alcohol, Proof and Tralle Scale .....		.60
2448	Hydrometers. Alcohol, proof and Tralle Scale, with thermometer, U. S.		
	Custom House scale 100 below proof and 100 above proof		1.50
2450	Hydrometers. Alkali and heavy liquids, Beaumé Scale, 0 to 50 in 1-1° .....		.50
2452	Hydrometers. Ammonia and light liquids, Beaumé Scale, 10 to 50 in 1-1° .....		.50

We are prepared to supply you a hydrometer for every purpose; specify for what you require them, and we will have it made if not in stock.

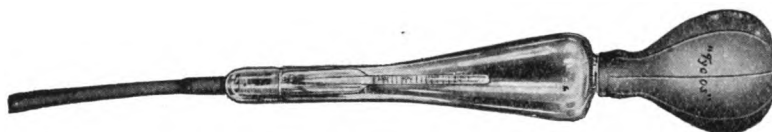
HYDROMETERS

2454	Hydrometers —Battery, Beaumé Scale, Round, 5 inches long, 10 to 40 in 1°....	\$0.50
2456	“ Battery, Flat Bulb, Short for Storage Batteries, Scale Range, 1150 to 1300.....	.80
2458	“ Battery, with Points, Beaumé and Specific Gravity, Range 1100 to 1300...	1.00
2460	“ Cider Beaumé Scale, 0 to 8 in 1° graduations.....	.50
2462	“ Coal Oil, Beaumé Scale, 10 to 90 in 1-1°.....	.50
2464	“ Coal Oil, with Thermometer, Beaumé Scale, 10 to 90 in 1-1°.....	1.50
2466	“ Coal Oil, Standard, 10 to 21, 19 to 31, 29 to 41, 39 to 51, 49 to 61, 59 to 71, 69 to 81, 79 to 91, Divided 1-10°.....	2.00
2468	“ Gasoline, Beaumé Scale, with Thermometer, Nickel Case, 6 inches long, 40 to 90 in 1°.....	2.00
2470	“ Light Liquids, Beaumé Scale, 10 to 100 in 1° Graduations.....	.50
2472	“ Light Liquids, Beaumé and Specific Gravity Scale, 0.700 to 1.000.....	1.00
2474	“ Light Liquids, Beaumé and Specific Gravity Scale, 0.700 to 0.800, 0.800 to 0.900, 0.900 to 1.000.....	1.00
2476	“ Light and Heavy Liquids, Universal, 15 inches long 0.700 to 2.000.....	1.50
2478	“ Heavy Liquids, Beaumé Scale, 0 to 70 in 1° Graduations.....	.50
2480	“ Heavy Liquids, Beaumé and Specific Gravity Scale, 1.000 to 1.900.....	1.00
2482	“ Heavy Liquids, Beaumé and Specific Gravity Scale, 1.000 to 1.900 with Thermometer.....	2.50
2484	“ Heavy Liquids, Beaumé and Specific Gravity Scale, 1.000 to 1.200, 1.200 to 1.400, 1.400 to 1.600, 1.600 to 1.800, 1.800 to 2.000.....	1.00
2486	“ Lime and Sulphur or (Sprayometer), New York Scale, 0 to 10° Beaumé and 1.000 to 1.100 Specific Gravity, 1-10° Beaumé, 1° Specific Gravity Divisions.....	.75
2488	“ Lime and Sulphur or (Sprayometer), New York Scale, 25-35°, Beaumé 1.210 to 1.320, Specific Gravity, 1-10° Beaumé, and 1° Specific Gravity Divisions.....	.75
2490	“ Lye, Beaumé Scale, 0 to 50 in 1° Graduations.....	.50
2492	“ Milk, New York Board of Health Pattern, Scale, 0 to 120° in 2° Graduations.....	.50
2494	“ Milk, New York Board of Health, with Thermometer, Scale, 0 to 120° in 2° Graduations.....	2.00
2496	“ Quevennes, 1.015 to 1.040 Specific Gravity Scale.....	.50
2498	“ Quevennes, 1.015 to 1.040 Specific Gravity Scale, 13 inches long, with Thermometer.....	2.00
2500	“ Salt or Pickle, per cent Scale, 0 to 100° in 1° Graduations.....	.50
2502	“ Silver Solution or Actinometers, Special Scale, 0 to 80° in 1° Graduations, 5 inches long, with Test Jar.....	.50
2504	“ Spirits. See Alcohol.	

HYDROMETERS

2506	Hydrometers—Sugar and Syrup, Beaumé Scale, 0 to 60°.....	\$0.50
2508	" Sugar, Brix's Scale, Plain, 0 to 30 in $\frac{1}{2}^{\circ}$ at $17\frac{1}{2}^{\circ}\text{C}$.....	.75
2510	" Sugar, Brix's Scale, with Thermometer, 16 inches long, 0 to 30 in $\frac{1}{2}^{\circ}$ at $17\frac{1}{2}^{\circ}\text{C}$	2.00
2512	" Vinegar, Beaumé Scale, 0 to 6° in 1° Graduations.....	.50
2514	" Spirit, U. S. I. R. Scale, with Certificate 0 to 100 in 1° Graduations ...	3.00
2516	" Wort and Beer, Kaiser's Sachrometers, with Thermometer.....	2.00
2518	" Twaddel's No. 1, 0 to 24, 1.000 to 1.120 Specific Gravity, No. 2, 24 to 48, 1.120 to 1.240 Specific Gravity, No. 3, 48 to 72, 1.240 to 1.360 Specific Gravity .....	.50
2520	" Same as above, No. 4, 72 to 100, 1.360 to 1.500 Specific Gravity; No. 5, 100 to 134, 1.500 to 1.670 Specific Gravity; No. 6, 134 to 180, 1.570 to 1.900 Specific Gravity .....	.75
2522	" Jars. See under Cylinders, page 173, No. 1640.	

NOTE — Temperature is 60° Fahrenheit and the approximate length over all is 10 inches for plain and 16 inches for combined with thermometer, unless otherwise specified.



Nos. 2524-2526

CHARGOMETER—SYRINGE BATTERY HYDROMETER

What is a Chargometer?

Briefly it is a gauge for determining the state of charge in storage batteries. By its use the exact strength of batteries is known, and the inconvenience occasioned by exhausted batteries is overcome.

Its Construction

A glass tube enlarged at the upper end, to prevent the adhering of the instrument to the sides, and also to bring to a minimum the distortion caused by reading the instrument through round glass walls. There are no rubber parts to dry up and drop out. All parts are renewable if lost or broken.

Its Use

By inserting the pointed tube of a chargometer in the storage cell opening, withdrawing fluid by means of the bulb, the specific gravity is indicated by the hydrometer in the cylinder.

2524	Specific gravity scale, 1150 to 1300. Best quality rubber bulb, rubber buffer in end of cylinder to prevent breakage of hydrometer. Length over all, 19 inches. Each in a wood carrying box with hinged cover. Price.....	each \$3.00
2526	Same scale as above, 2d quality rubber bulb, without rubber buffer. Length over all, 15 inches. Each in pasteboard box. Price.....	each 2.00

HYGROMETERS

Various forms of this instrument have been devised for determining the amount of moisture in the atmosphere, ascertaining the relative humidity, and forecasting the probability of frost, but none with the same universal satisfaction (when the instrument is understood and proper observation taken) as the form known as Mason's Hygrometer. *The construction* of this instrument consists of two thermometers as nearly alike as possible in range of scale, mounted on either side of a block of polished wood with a cistern of water between. The thermometer marked *dry* is exposed to the air, the other, marked *wet*, has its bulb surrounded by a piece of silk, which passes down into the opening in the cistern acting as a wick and keeping the bulb of the thermometer constantly moist. As evaporation causes a loss of heat, the wet bulb thermometer will read lower than the other, provided there is any degree of dryness in the air. When the air is very dry, the difference in their readings will be great; if moist, the difference will be proportionately less, but if the air is fully saturated, both thermometers will read alike as there can be no evaporation.

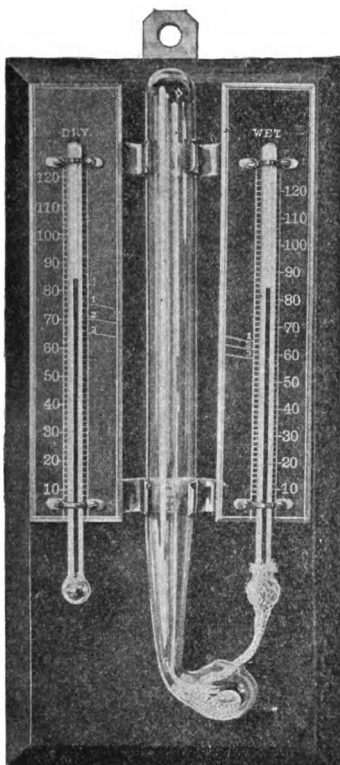
By the use of tables, which we furnish with each Hygrometer, the point at which the air would begin to deposit moisture, known as the dew point, and the percentage of saturation of the air (humidity) are readily ascertained.

(No tables are required when the "Hygrodeik" is used.)

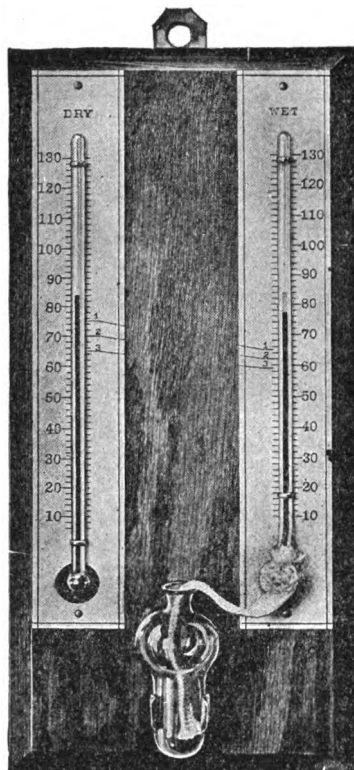
Dew is formed by the radiation of heat from the surface of trees, plants, etc., consequently reducing the temperature of the air near the immediate surface of such objects to the point of complete saturation, causing moisture to be deposited. The Hygrometer therefore becomes of the greatest value to the farmer and florist, since in the hands of an intelligent observer the formation of frost can be foretold with certainty, enabling him to take steps to prevent damage to delicate plants exposed to the open air. If the temperature of the air on a clear day at sundown be 50° and the reading of the wet bulb thermometer 40° , the dew point, according to the tables referred to, would be 27° and frost would follow with certainty; but should the wet bulb thermometer stand at 47° and the temperature of the air 50° , then the dew point would be reached at 44° and no frost need be feared.

In the household for maintaining a degree of healthful humidity; in the sick chamber, where by its use any degree of moisture will be indicated, in many branches of manufactures, as cotton carding, incubating, in drying rooms, malt houses and greenhouses, it is gradually being recognized as an indispensable instrument.

HYGROMETERS



No. 2528



No. 2532

MASON HYGROMETERS—(WET AND DRY BULB)

For determining the relative and absolute humidity and dew point, and foretelling frosts in connection with tables and directions.

STANDARD GRADE

- 2528 **Magnifying Mercury Tubes.** Black* oxidized brass scales, white filled figures and graduations. Insulating brass supports. Mahogany finish board. Size 11x5 inches..... \$4.50
- 2530 In 10-inch copper case, black* oxidized brass scales, white filled figures and graduations..... 6.50

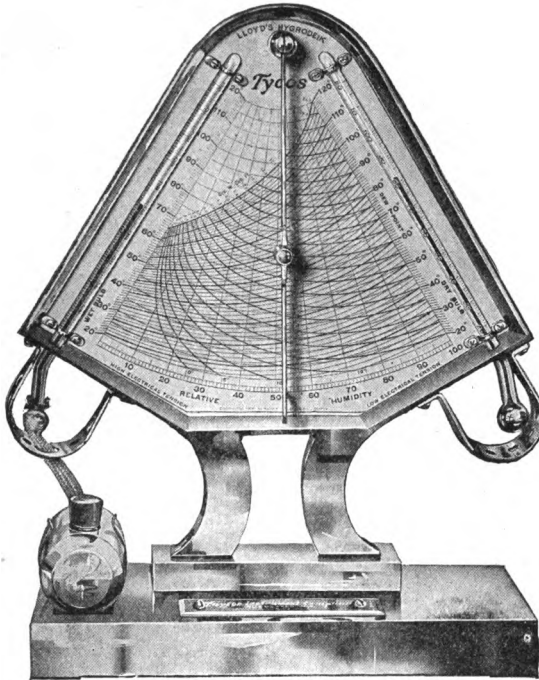
MEDIUM GRADE

- 2532 **Magnifying Mercury Tube.** Black* oxidized brass scales, white filled figures and graduations; without insulating supports. Oak board. Size 11x5 inches..... 2.25

*If silvered scales are desired, designate by letter "W."

Extra silk wicks, \$1.20 per dozen.

HYGROMETERS



Nos. 2534-2550

HYGRODEIK (COPYRIGHTED)—(WET AND DRY BULB)

For determining the relative and absolute humidity and dew points and foretelling frosts without any reference to *tables.

No.		Scale Range	Price Each
2534	German Silver Dial, Black Japanned Iron Frame.....	20 to 120° F.	\$12.00
2536	German Silver Dial, Polished Brass Frame.....	20 to 120° F.	13.50
2538	German Silver Dial, Oxidized Brass Frame.....	20 to 120° F.	14.00
2540	German Silver Dial, Black Japanned Iron Frame.....	80 to 180° F.	12.00
2542	German Silver Dial, Polished Brass Frame.....	80 to 180° F.	13.50
2544	German Silver Dial, Oxidized Brass Frame.....	80 to 180° F.	14.00
2546	Card Dial, Black Japanned Iron Frame.....	20 to 120° F.	10.50
2548	Card Dial, Polished Brass Frame.....	20 to 120° F.	12.00
2550	Card Dial, Oxidized Brass Frame.....	20 to 120° F.	12.50

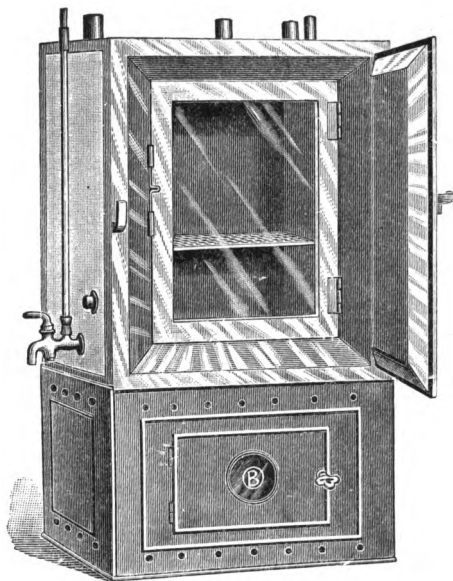
Extra Silk Wicks, \$1.20 per dozen. Extra Tubes, \$2.50.

NOTE— If centigrade scales are desired, designate by letter "C," same prices as above.

*To find the relative humidity, swing the index hand to the left of the chart and adjust the sliding pointer to that degree line upon the chart which corresponds with the degree of temperature shown upon the engraved stem of the wet bulb thermometer. Then swing the index hand to the right until the sliding pointer intersects the curved line which extends downward to the left from the degree line upon the chart corresponding with the indicated temperature of the dry bulb thermometer. At this intersection the index hand will point to the relative humidity on the scale at the bottom of the chart.

BACTERIOLOGICAL INCUBATORS

TRIPLE WALL



Nos. 2552-2556

Incubator, three walls, made of highly polished copper with conical bottom, having both air and water space, the outer surface being covered with insulating material to insure an even temperature, and the exposed copper parts are lacquered to prevent tarnishing.

It is provided with two doors, the inner one of beveled glass which permits observation of cultures, without disturbing the temperature. The outer door, of copper, double wall, is prismatic, properly fitted, with felt buffers to insure perfect fit and close contact.

There are tubulations for thermo-regulator, thermometer and for filling into water space; these are properly marked. A metal tube passes through the air space for connecting with gas supply.

The control of temperature in the air space is effected by a ventilator on top of the oven.

The incubator is supported on a sheet iron base, 10 inches high, finished in dull black, having a door, with an opening covered with mica for observation of the flame.

2552 Incubator—with one shelf.

Inside dimensions, 9 inches high, 7 inches wide, 7 inches deep.

Outside dimensions, 13 inches high, 11 inches wide, 10½ inches deep.

Priceeach \$35.00

2554 Incubator—with one shelf.

Inside dimensions, 12 inches high, 9 inches wide, 9 inches deep.

Outside dimensions, 17 inches high, 14 inches wide, 13 inches deep.

Priceeach \$45.00

2556 Incubator—with two shelves.

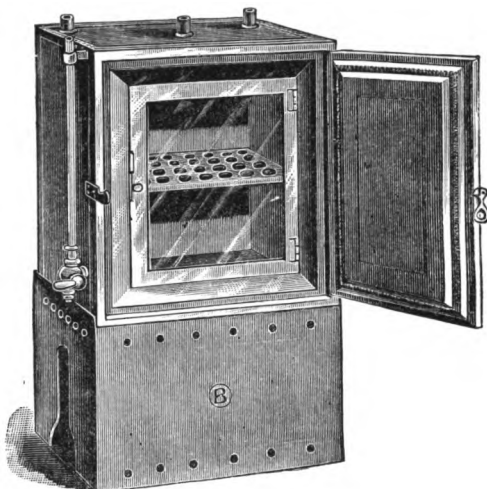
Inside dimensions, 14 inches high, 12 inches wide, 10 inches deep.

Outside dimensions, 19 inches high, 17 inches wide, 14 inches deep.

Price\$60.00

BACTERIOLOGICAL INCUBATORS

DOUBLE WALL



Nos. 2558-2560

Incubators, double wall and with water space only, otherwise, construction is the same as our three-wall incubator, illustrated under Nos. 2552-2556. The sheet iron base is 9 inches high and has the opening for burner on the side.

2558 Incubator—with one shelf.

Inside dimensions 10 inches high, 8 inches wide, 8 inches deep.

Outside dimensions 13 inches high, 11½ inches wide, 11½ inches deep.

Price each \$35.00

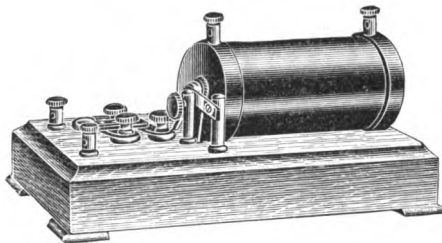
2560 Incubator—with two shelves.

Inside dimensions 12 inches high, 10 inches wide, 10 inches deep.

Outside dimensions 15 inches high, 13½ inches wide, 13½ inches deep.

Price each \$40.00

Any of above incubators can be furnished electrically heated; prices upon application.



No. 2562

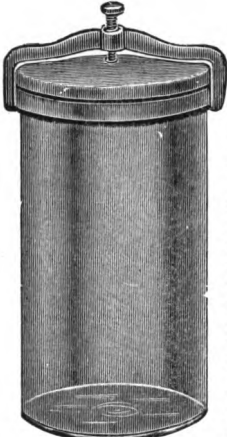
2562 Induction Coils, Ruhmkorff's, with automatic brake and of durable make on polished mahogany base.

Length of Spark . . . inches	¼	⅜	½	¾	1	1¼	1½
Price each	\$4.50	6.75	9.00	13.50	18.00	22.50	27.00

Length of Spark . . . inches	2	3	4	5	6	8
Price each	\$36.00	54.00	72.00	90.00	108.00	144.00

SPECIMEN JARS

2564 These jars are now made without contraction at the neck, so that the width of the mouth is the same as the inside diameter of the body of the jar.



No. 2564

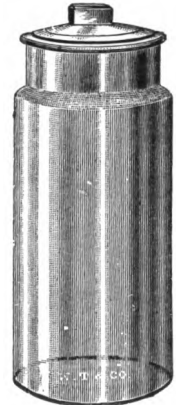
The contents are enclosed entirely in glass, with a thin rubber medium under the lid to make a tight joint.

Width of Mouth, ins.	Height without Lid Inches	Capacity Approx.	Price Each	Price per Dozen	Width of Mouth, ins.	Height without Lid Inches	Capacity Approx. Gallons	Price Each	Price per Dozen
2 1/4	4	1 1/2 Pt.	\$0.70	\$6.75	6 1/4	8	1	\$2.60	\$26.00
2 1/4	6	3/4 Pt.	.75	7.50	6 1/4	12	1 1/2	2.90	29.00
2 1/4	8	1 Pt.	.80	8.00	7 5/8	6	1 1/2	3.75	37.50
2 1/4	12	1 1/2 Pt.	.90	8.75	7 5/8	8	1 1/2	4.00	40.00
2 1/4	18	2 1/4 Pt.	1.00	10.00	7 5/8	12	2 1/4	4.55	45.50
3 1/2	6	1 3/4 Pt.	1.05	10.50	7 5/8	15	2 3/4	5.00	50.00
3 1/2	8	2 1/2 Pts.	1.15	11.25	7 5/8	18	3 1/2	5.35	53.50
3 1/2	12	4 Pts.	1.35	13.25	7 5/8	24	4 1/2	6.15	61.50
3 1/2	18	6 Pts.	1.60	15.75	7 5/8	36	7	8.00	80.00
5	8	2 3/4 Qts.	2.00	20.25	11 1/2	12	4 3/4	9.50	95.00
5	12	4 Qts.	2.40	24.00	11 1/2	18	7 1/4	12.00	120.00
5	15	5 Qts.	2.55	25.50	11 1/2	24	10	15.00	150.00
5	18	6 Qts.	2.75	27.50	....	..	.....	.....	.....

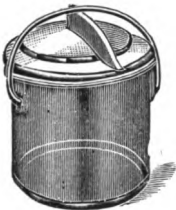
2566 Made of clearest flint glass, with mouths nearly as wide as the jars themselves, and glass stoppers carefully ground in.

In ordering, give diameter of body and height to shoulder.

Diam. of Body, Ins.	Height to Shoulder Inches	Capacity to Neck Ounces	Price Each	Price per Dozen	Diam. of Body, Ins.	Height to Shoulder Inches	Capacity to Neck Ounces	Price Each	Price per Dozen
1 1/2	2	1 1/2	\$0.30	\$3.00	3 3/4	6	29	\$0.85	\$ 8.50
1 1/2	3	2 1/2	.33	3.25	3 3/4	8	40	1.05	10.50
2	2 1/2	3	.35	3.50	3 3/4	10	52	1.25	12.50
2	3 3/4	5	.38	3.75	4 1/2	5	38	1.10	10.75
2	5	6	.43	4.25	4 1/2	8	62	1.35	13.50
2 1/2	3 1/2	8	.45	4.50	4 1/2	12	92	1.60	16.00
2 1/2	5	11	.50	5.00	6	7	98	1.90	19.00
2 1/2	7	16	.55	5.50	6	10	140	2.50	25.00
3	4	14	.60	5.75	6	12	168	2.70	27.00
3	6	20	.65	6.50	6	15	212	3.10	31.00
3	8	28	.80	7.75	...	..	...	....	.....



No. 2566

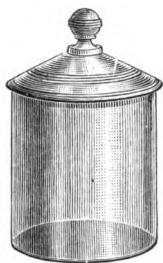


No. 2568

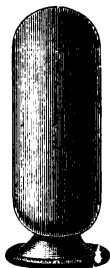
2568 Made of clear white glass, with wire clamp; glass cover fitting air-tight with rubber ring.

Capacity.....pints	1/2	3/4	1	1 1/2
Each.....	\$0.10	.15	.20	.25
Dozen.....	1.20	1.50	2.00	3.00

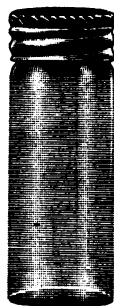
JARS



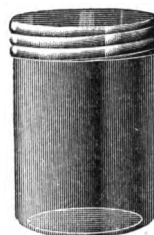
No. 2570



No. 2572

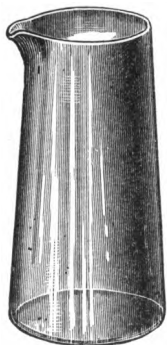


No. 2574



No. 2576

2570	Jars, Storage. Plain round jars, pressed glass lids.							
	Capacity.....	gals.	$\frac{1}{4}$	$\frac{1}{2}$	1			
	Each.....		\$0.40	.60	.85			
2572	Jars, Show Bottles. Inverted, for ore samples.							
	Capacity.....	oz.	4	8	16	32	128	
	Each.....		\$0.15	.20	.25	.40	.70	
	Dozen.....		1.50	2.00	2.50	4.00	7.00	
2574	Jars, Screw-capped. Nickel-plated cover, high form.							
	Capacity.....	oz.	4	8	16			
	Dozen.....		\$1.00	1.50	2.00			
2576	Jars, Screw-capped. Nickel-plated cover, low form.							
	Capacity.....	oz.	1	2	4			
	Dozen.....		\$0.60	.80	1.00			

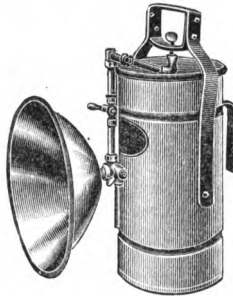
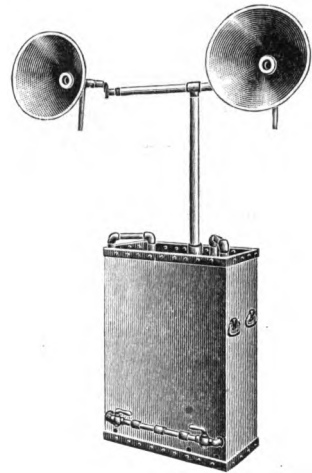


No. 2578



No. 2580

2578	Jars, Precipitating. With lip, stout glass.							
	Capacity.....	pts.	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	8
	Each.....		\$0.20	.25	.35	.50	.80	1.25
2580	Jars, Stoneware. With handles and cover, waste jars.							
	Capacity.....	gals.	1	2	3	4	5	
	Each.....		\$0.40	.60	.80	1.00	1.20	
	Jars, Hydrometer. See Cylinders, page 173, No. 1640.							
	Jars, Nessler's. See Cylinders, page 172, No. 1634.							

MILBURN LIGHTS**FOR CONTRACTORS, TUNNELS, MINERS, FOUNDRIES, ETC.****No. 2632****No. 2634****No. 2638****BUILDERS AND EMERGENCY LIGHT**

The Milburn Light is an improved gas light, generated from acetylene in so simple and perfect a manner that, to obtain same, it is merely necessary to turn on the tap and apply a light.

It adjusts itself immediately to any size flame, or any reasonable number of burners used, and requires absolutely no attention until burnt out.

The apparatus mainly comprises three parts. An outer tank holding water, and an inner receptacle holding the chemical, and a burner standpipe. The light closely resembles sunlight. It is fifteen times more powerful than coal gas, and is more penetrating and diffusive for the size of flame than any existing light.

- | | | | |
|------|-----------------|--|---------|
| 2632 | 50 | Candle power, 10 hours. A most convenient hand light. Size, 6x12 inches; weight, 6½ pounds, each..... | \$13.50 |
| 2634 | 500 | Candle power, for fire and salvage work. Extra powerful size 7x14 inches. Weight, 10 pounds, each | 18.00 |
| 2636 | 5,000 to 12,000 | candle power, lights 1500 feet. The light of these lamps closely resembles sunlight. Every part is water sealed, making them absolutely safe. Size, 12x36 inches; height, 6 feet, each..... | 83.00 |
| 2638 | 12,000 | Candle power, lights 3,000 feet. Same as No. 2636, only with twin cylinders, two storm-proof burners, and two non-tarnishing parabolic reflectors. Size, 12x24x36 inches; height, 6 feet, each | 114.00 |

EXTRA CYLINDERS

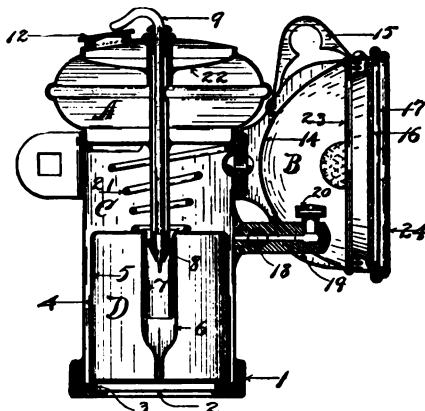
- | | | | |
|------|-------|--|-------|
| 2640 | Extra | cylinder comprises set of trays, inner receptacle, and cover complete, each..... | 18.00 |
|------|-------|--|-------|

ACETYLENE LAMPS

FOR ENGINEERS, SURVEYORS, MINERS, CAMPERS, ETC.



No. 2642



No. 2642

Acetylene lamps are cleaner, more convenient, and cheaper to operate than candles or oil lamps. Acetylene light resembles daylight and facilitates a more accurate examination of veins and ores, especially their color. Notebooks, etc., are not soiled by grease nor the air polluted by smoke—in fact, less oxygen is consumed by acetylene lamps than by oil or candles. They will burn in places where candles and oil lamps go out.

COLUMBIA AUTOMATIC ACETYLENE LAMPS

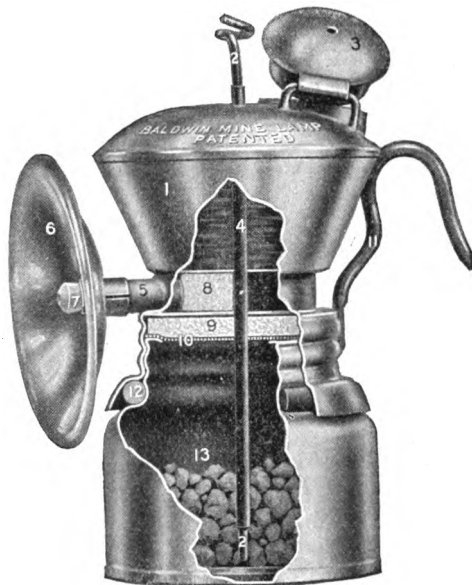
Ideal for mining engineers, superintendents, surveyors, campers, watchmen, bicyclists, etc. Made of heavy brass with gun metal finish and have double convex lense, fishtail or pencil burner (as desired), gas and water valves. Burn five hours on one charge. Enclosed and not affected by strong winds.

2642 Bale Lamp, without Dark Lantern Shutter	\$3.50
Buggy or Bicycle, Bracket extra .....	.40
Watchman's Dark Lantern with Shutter, and without Colored Side Lights	4.50
Watchman's Lamp, without Shutter and Side Lights	3.50

EXTRA PARTS, PRICES POSTAGE PAID

A. Lamp Body, Complete	\$1.80	B. Thumb Nut and Bolt	\$0.10
D. Carbide Cup, Complete .....	.50	1. Bottom Cap	1.00
2. Bottom Plate .....	.10	3. Rubber Gasket .....	.10
5. Carbide Cup Body .....	.30	6. Water Distributer .....	.30
9. Water Valve .....	.15	12. Filler Cap .....	.10
14. Reflector .....	.30	17. Lens Retainer Wire .....	.10
16. Double Convex Lens .....	.30	Gas Valve Stem, Screw and Washer .....	.25
18. Gas Valve Complete .....	.40	21. Spiral Spring .....	.17
Extension Base Complete .....	.45	Buggy Dash Bracket .....	.40
20. Burner—Pencil Flame .....	.17	Hand Bracket .....	.70
Burner—Fishtail Flame .....	.25	Bracket Extension, no Bolts .....	.14
23. Reflector Retainer Wire .....	.10		
Bicycle Bracket .....	.40		
Front Door without Glass or Retainer Wire .....	.30		
Screw and Washer for Gas Valve .....	.10		

BALDWIN ACETYLENE LAMPS



DESCRIPTION OF THE BALDWIN MINE LAMP

We show herewith, a sectional view of the Baldwin Mine Lamp. While at first sight the many parts may lead you to believe that this lamp is rather complicated, a second observation will show that but few of these various parts have to do with the actual working of the lamp. The other parts are not subject to wear nor can they, in any manner, get out of order. There are no springs nor regulating devices to cause trouble. Anyone can successfully operate the Baldwin the first time they try.

Viewed as a whole, the lamp consists of four parts, a carbide container, a water-tank, burner and a wire agitator. A pipe or tube projects from the water-tank, into the carbide container. In this pipe there is a wire agitator. There is just enough free space between the wire agitator and the sides of the tube to permit the proper amount of water to get to the carbide. This wire is also used to free the tube from any stoppage or sediment which might collect in same. This is indicated by the flame burning low. A turn or two of this wire clears the tube and immediately the flame assumes its normal size and the lamp again burns brightly. Sudden jars or a fall will not injure the lamp or affect the light. It will burn perfectly, for a time, if laid on its side or even held in an inverted position.

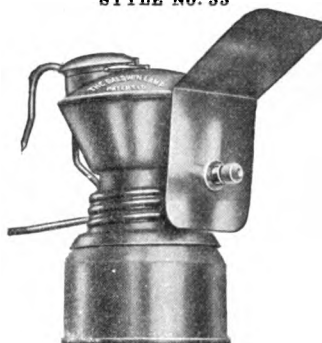
The names of the various parts indicated by numbers above are given below.

No.	Name	No.	Name
1.	Water-tank.	8.	Small Felt.
2.	Raking Wire.	9.	Large Felt.
3.	Cover of Water-Tank.	10.	Wire Gauze.
4.	Water-tube.	11.	Hook.
5.	Burner-tube.	12.	Rubber Gasket.
6.	Reflector.	13.	Carbide Container.
7.	Burner.		

For prices and illustrations of repair parts, page 286.

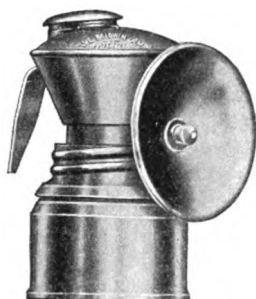
BALDWIN ACETYLENE LAMPS

STYLE No. 33



No. 2650

STYLE No. 31



No. 2646

2644 Style No. 30. Give 14-18 candle power. Weight, 5 ounces, height, $3\frac{3}{4}$ inches. One extra carbide container with each lamp..... \$1.00
While this lamp is fitted with a positive shut-off valve, it operates under the well-known "Baldwin" method, which insures a steady and uniform flame. It is the most substantial valve made, but we do not recommend valve lamps in low mines, as the first blow against the roof will put a valve lamp out of commission.

Fitted with No. 2 Reflector when a concentrated light is desired. May be supplied with No. 1 Flat Reflector, if so specified.

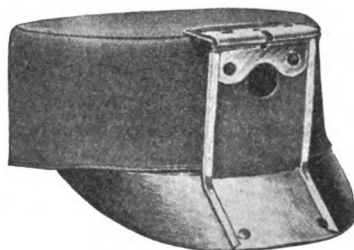
2646 Style No. 31. Same as above, but without the positive shut-off valve, the regulation of the water being automatic. Fitted with cap-hook the same as Sunshine Oil Lamps. Each..... \$1.00

2648 Style No. 32. Same as No. 31, but with the regular cap-hook and steady braces. Fitted with No. 2 Reflectors. Each..... 1.00

2650 Style No. 33. Same as No. 32, but supplied with No. 1 Flat Reflector, which shields the flame from water dripping from the roof. Each... 1.00

Extra carbide containers, each..... .15

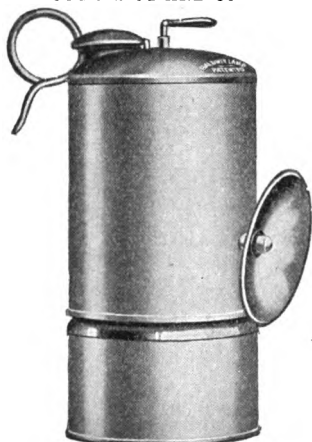
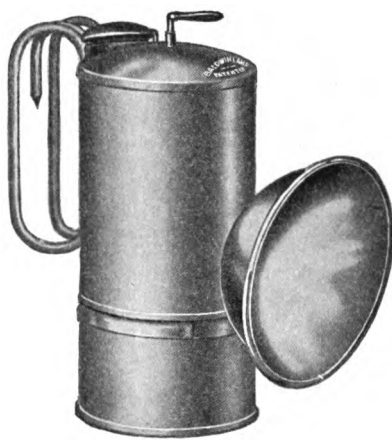
If extra carbide containers are not wanted deduct \$0.15 from list price of lamp.



No. 2652

2652 Miner's Canvas Caps. For use with Nos. 30, 32 and 33 lamps. Size $6\frac{3}{8}$ to $7\frac{1}{4}$. Price each..... .25

Write for circulars and quotations upon quantities.

BALDWIN ACETYLENE LAMPS**STYLES 34 AND 35****No. 2654****STYLES 36 AND 38****Nos. 2656-2658****HALF-SHIFT LAMPS**

2654	Made of galvanized iron.				
Style	Burns on	Weight	Height	Price	
No.	One Charge	Charged	Inches	Each	
34	6 hours	11 oz.	6	\$1.25	
35	12 hours	15 oz.	6½	1.25	

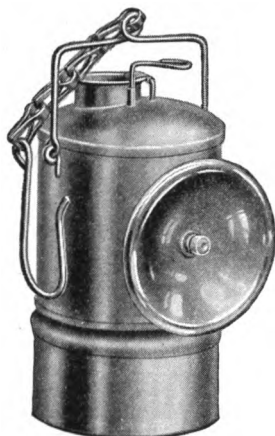
One extra carbide container furnished with each lamp. Extra containers, \$0.30 each.

SUPERINTENDENT'S LAMP

2656 Style No. 36. Burns 6 hours with one charge. Weight, 10 ounces. Height, 6½ inches. Made of galvanized iron. This lamp will throw a strong light over 50 feet. Makes overhead examinations easy. One extra carbide container with each lamp. Price..... \$2.00

Extra carbide containers, each30

2658 Style No. 38. Same as No. 36 but of brass, nickel-plated. Price..... 2.00

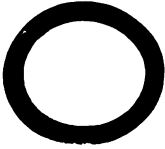
**No. 2660 [STYLE 39]**

2660 The hook and chain will make it convenient to hang this lamp to rock, timber or candlestick. This lamp is easily carried when climbing ladders. Burns five hours on one charge.

Weight, 4½ ounces. Height, 5½ inches. One extra carbide container with each lamp.

Price..... \$1.25

Extra carbide containers, each..... .20

BALDWIN ACETYLENE LAMPS**REPAIR PARTS**

GASKET FOR LAMPS
Nos. 34, 35, 36, 38 and 39



GASKET FOR LAMPS
Nos. 30, 31, 32 and 33

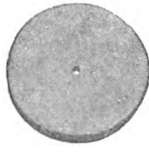


RAKING WIRE

Gaskets for Lamps, Nos. 34, 35, 36 38 and 39, per dozen	\$0.75
Gaskets for Lamps, Nos. 30, 31, 32 and 33, per dozen .....	.50
Valve Rods for Lamp No. 30, per dozen	1.00
Raking Wires for Nos. 31, 32 and 33, per dozen .....	.35
Raking Wires for Nos. 34, 35, 36, 38 and 39, per dozen .....	.80



SCREEN



FELT

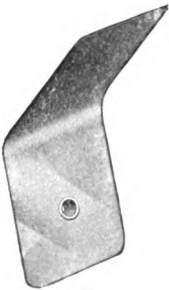


SMALL FELT



BURNER

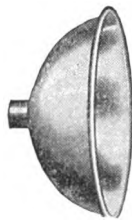
Screen, per dozen	\$0.25
Felt, per dozen .....	.35
Small Felt for Lamps .....	.20
Burners, per dozen .....	.25
Burner Cleaners, per dozen .....	.35
Wire on Spools for Burner Cleaners, each .....	.10

REFLECTORS**CARBIDE CONTAINERS**

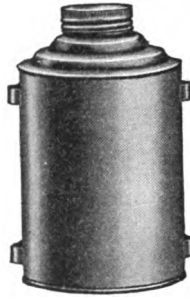
No. 1



No. 2



Nos. 3 and 4



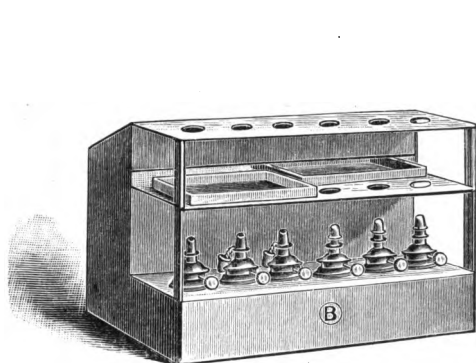
Six 8-Hour Shifts



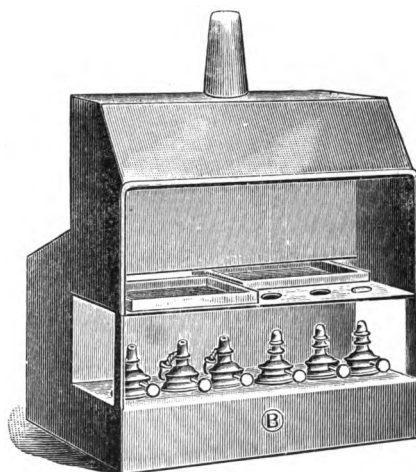
One 10-Hr. Shift

Reflectors, No.1, per dozen	\$0.20
Reflectors, No. 2, per dozen .....	.25
Reflectors, No. 3, 3-inch diameter, per dozen	2.40
Reflectors, No. 4, 2¼-inch diameter, per dozen	1.20
Carbide Containers, capacity, six 8-hour shifts, or 1 lb. Carbide, per dozen	2.40
Carbide Containers, capacity, one 10-hour shift, or ½ lb. Carbide, per dozen	1.50
Calcium Carbide, size ½-inch. 2-lb. cans (original case contains 20 cans). Size ½-inch, 10-lb. cans (original case contains 6 cans). Size 1-inch, 10-lb. cans (original case contains 6 cans). Size ¼x½-inch, 100-lb. drums. Size, 1¼x¾-inch, 100-lb. drums.	
Prices on application.	

LAMPS



No. 2662



No. 2664

2662 Lamps, Parting. By W. H. Leavens; for alcohol; galvanized iron, very strong; shelves for sand bath and annealing cups; upper shelf perforated for holding test tubes.

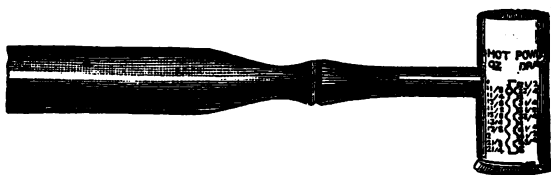
No. of burners.....	6	8	12
Each.....	\$3.00	3.50	4.50

2664 Lamps, Parting. Same as above, except upper shelf is left out so as to use flasks instead of test tubes. Hood and pipe attached for carrying off fumes.

No. of burners.....	6	8	12
Each.....	\$3.50	4.00	5.00

2666 Lamp Wicks. For parting lampsdoz. \$0.10

LEAD MEASURES



No. 2668

2668 Lead Measures. Of improved construction for test lead..... .25

Lead Foil. Chemically Pure. See Chemical List, page 495.

Lenses. See Magnifiers, pages 290, 291.

LEVELS



No. 2670



No. 2672



No. 2674

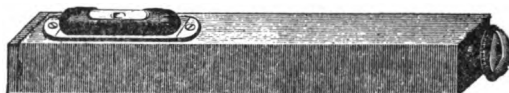
2670 Levels, Glass. Not mounted.

Length.....in.	3	4	5	6
Each.....	\$0.12	.15	.20	.25

2672 Levels, Mounted. In nickel-plated cases.

Length.....in.	3	4	5
Each.....	\$0.30	.40	.50

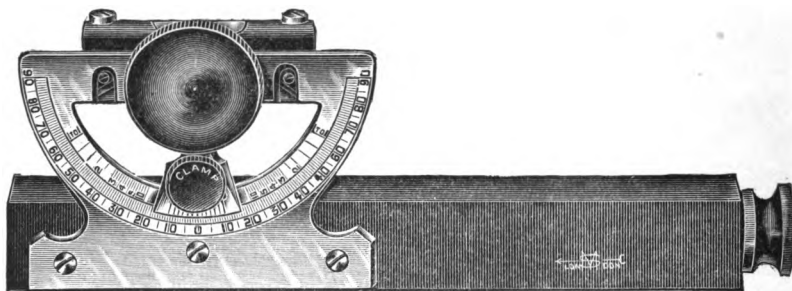
2674 Levels. Round brass case; nickel-plated, 1½ in. diam. each \$0.75



No. 2676

2676 Level, Hand Sighting. Square tube bronzed, 5 inches in case. The bubble and the field of view are both clearly visible at the same time. As the lower surface of the tube is flat and parallel with the bubble, these levels can be used as a contact level.

Price..... \$4.50



No. 2678

ABNEY'S LEVELS

All "S. & M." Abney Levels have German silver arcs in place of brass or brass silvered ones, divided each way to 90° vernier reading to 10' with positive clamping device. Reflector is of silver and all eye tubes are made to draw out. Each instrument is packed in a case with book of instructions.

2678 Abney's Level. Five inches long, large German silver arc with draw telescope and improved fixing clamp to vernier.

Complete in leather case..... \$15.00

2680 Same as above, with compass attached 20.75

MAGNETS AND MALLETs



No. 2682

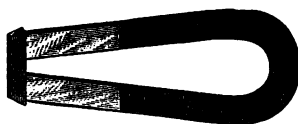
- 2682 **Litmus Pencils.** Of chemically pure litmus, blue on one end and red on the other.....each \$0.25



No. 2684

- 2684 **Magnets, Bar, Straight.**

Size.....inches	4	5	6	8	10
Each.....	\$0.20	.25	.30	.40	.50



No. 2686

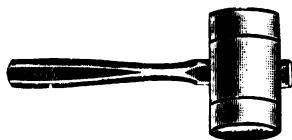
- 2686 **Magnets, Horseshoe.** Superior quality.

Size.....inches	2	2½	3	4	5	6	8	10	12
Each.....	\$0.05	.06	.10	.12	.15	.25	.70	1.20	2.00

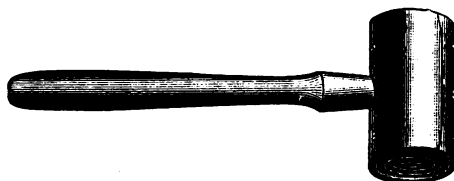
Mailing Envelopes. See Paper, page 327, No. 2920.



No. 2688



No. 2690



No. 2692

- 2688 **Mallets, Fiber Ends.** Best quality.

Diameter.....inches	2	2½
Each.....	\$0.90	1.00

- 2690 **Mallets, Hardwood.**.....each \$0.50

- 2692 **Mallets, Rawhide.** Best quality, 2¾ inches diameter.....each 2.00

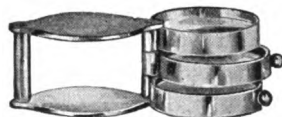
MAGNIFYING GLASSES

VULCANITE MOUNTING



No. 2694

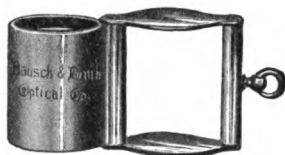
NICKELED MOUNTING



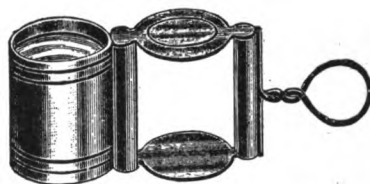
No. 2696

These magnifying glasses are made in one, two or three lenses, which may be used singly or in combinations for different magnifications.

	1-Lens	2-Lens	3-Lens
2694 Magnifying Glasses. Vulcanite Mounting, 1 inch diameter.....	\$0.45	.70	1.00
2696 Magnifying Glasses. Nickeled Metal Mounting, 1 inch diameter	\$0.55	.80	1.20



No. 2698



No. 2700

These are genuine Coddington Magnifiers, very powerful, in nickel-plated folding cases.

2698 Magnifying Glasses, Coddington.

Diameter.....	1/2 in.	3/4 in.	1 in.	1 1/2 in.
Price	\$1.50	1.75	2.00	3.00

"How to Read a Magnifier."

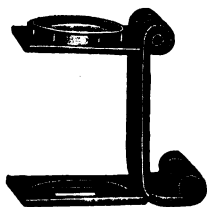
For satisfactory results magnifier should be held at about the distance from the eye a spectacle lens is ordinarily worn. If this rule is disregarded, the size of the visual field is limited and the marginal definition is likely to be indistinct.

2700 **Magnifiers, Globe.** The Globe lens is a perfect sphere, consisting of a hollow flint glass globe, made in halves, and enclosing a solid crown glass globe. By the principles of its construction the aberrations are corrected to a higher degree than has heretofore been obtained by any other construction. This lens has an optical axis in any direction, hence the field is perfectly flat and distinct to the outer edge; and what is true of no other lens, the field is always the largest possible. Pocket magnifiers made on this principle are furnished as follows:

No. 290—1-inch focus, nickel-plated brass mount, magnifying 11 diameters	\$4.00
No. 291—3/4-inch focus, nickel-plated brass mount, magnifying 14 diameters	5.00
No. 292—1/2-inch focus, nickel-plated brass mount, magnifying 21 diameters	6.00

In ordering magnifiers, always specify diameter.

MAGNIFIERS



No. 2702



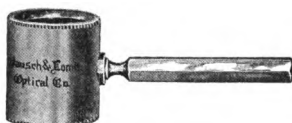
No. 2704

- 2702 Magnifier, Thread Counter.** Especially for screen and linen counting is mounted at a distance above the base equal to its focal length, while an opening in the base exposes the object to be magnified. Both lens mount and base are hinged to fold up compactly when not in use. In $\frac{1}{4}$ or $\frac{1}{2}$ -inch size.

Price\$0.30

- 2704 Tripod Magnifier.** This Magnifier is of sufficient power for elementary biological work and because of its large, clear field is quite widely used for dissections. It consists of two double convex lenses, separated by a diaphragm, in a mounting which screws up and down in the brass frame for focusing.

Price.....\$0.50



No. 2706

- 2706 Magnifier, Aplanatic.** Giving a perfectly flat field of great brilliancy and definition.

Price.....\$1.00

READING GLASSES



No. 2708

Too much emphasis can scarcely be laid upon the quality of these reading glasses. They are unsurpassed, we believe, in optical properties, design and workmanship.

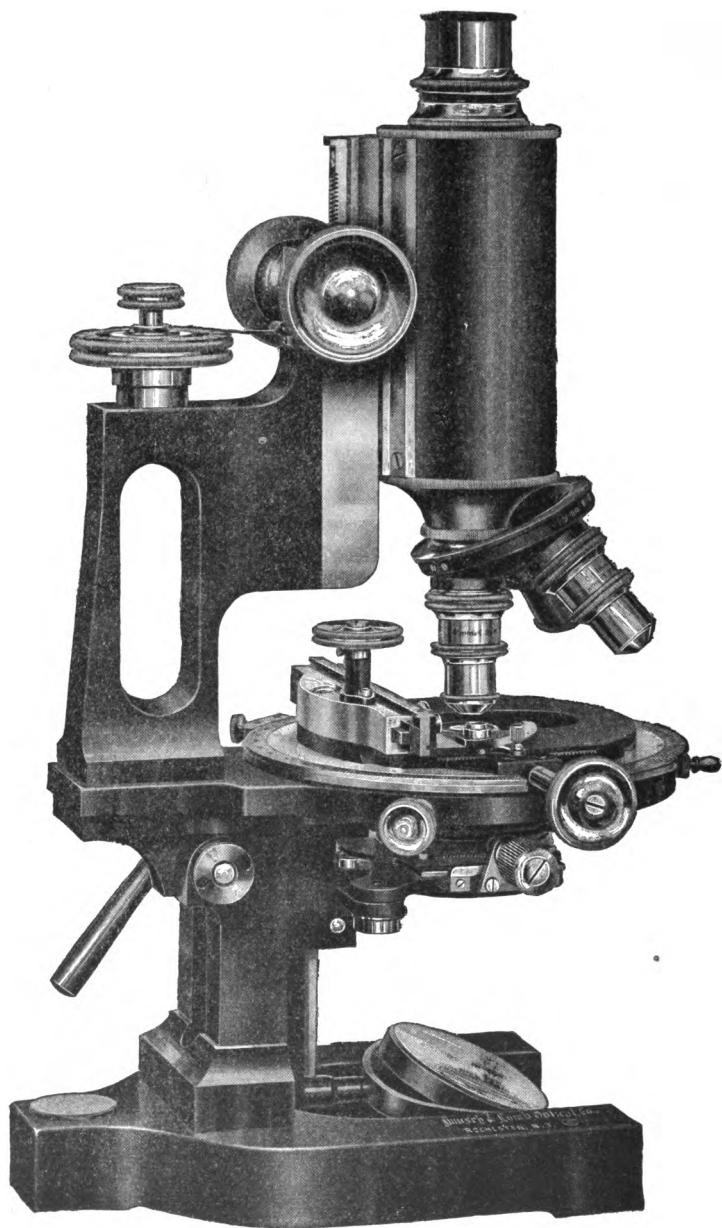
The lenses are accurately ground of clear, white optical glass and highly polished. While giving comparatively low magnifications, they cover a wide field. Rims are nickel-plated of sufficient width to protect the lens surfaces. The handles are of ebonized wood.

2708

Diameter	inches	2	2½	3	3½	4	4½	5	5½	6
Eq. Focal Length	inches	5	6	7	8	10	12	13	14	15
Price.....	each	\$0.50	.70	.80	1.20	1.50	2.00	3.00	3.50	4.00

MICROSCOPES

TYPE DDH



No. 2710
(.5 Actual Size)

For description, dimensions, prices, etc. see following page.

MICROSCOPES

TYPE DDH

Base—Horse-shoe form; extra large.

Pillar—Double rectangular in section; provided with inclination joint and clamping lever to secure instrument in any position, and with stops in the vertical and horizontal positions.

Arm—Handle type, of enlarged design, providing ample space for manipulation of any object desired.

Body Tube—Of aluminum, 50 mm. outside diameter; provided with society screw thread; standard size eyepieces are used; draw tube graduated in single millimeters with every tenth line numbered, adjustable in cloth-lined sleeve, or in metal fitting, if so specified, and provided with a society screw thread; lower collar may be removed for attaching the Micro-Tessar, 72 mm. objective.

Focusing Adjustment—Coarse adjustment by standard rack and pinion; fine adjustment of our lever type with micrometer screw head in two parts for slow and rapid movement, the larger graduated into 100 divisions, each equal to .0025 mm. in vertical movement, and provided with a hinged indicator, which may be turned back from the head.

Stage—Revolving mechanical, with circumference graduated into single degrees and read by a convenient vernier; measures 126 mm. outside and 112 mm. inside the graduations; provided with two rack and pinion movements, covering a range of 75 mm. and 35mm., respectively; provided with centering screws and removable for substitution of plain stage, if desired, or upper part may be removed, leaving a large, flat surface with one rack adjustment.

Substage—Complete with swing-out condenser, and so arranged that all substage accessories, inserted into the upper sleeve, may be easily employed; adjustable by standard rack and pinion; upper iris diaphragm of dome shape, self-locking, combined with Abbe condenser, the whole easily removable from substage; Abbe condenser removable from optical axis by a double swing movement to one side, releasing upper iris diaphragm for use; lower iris diaphragm adjustable laterally by rack and pinion for oblique illumination, revolvable about its own axis and mounted on a swinging arm, allowing it to be swung entirely out of the optical axis.

Mirror—Plane and concave, 50 mm. in diameter; adjustable in two planes in a fork, attached in fixed position to substage support.

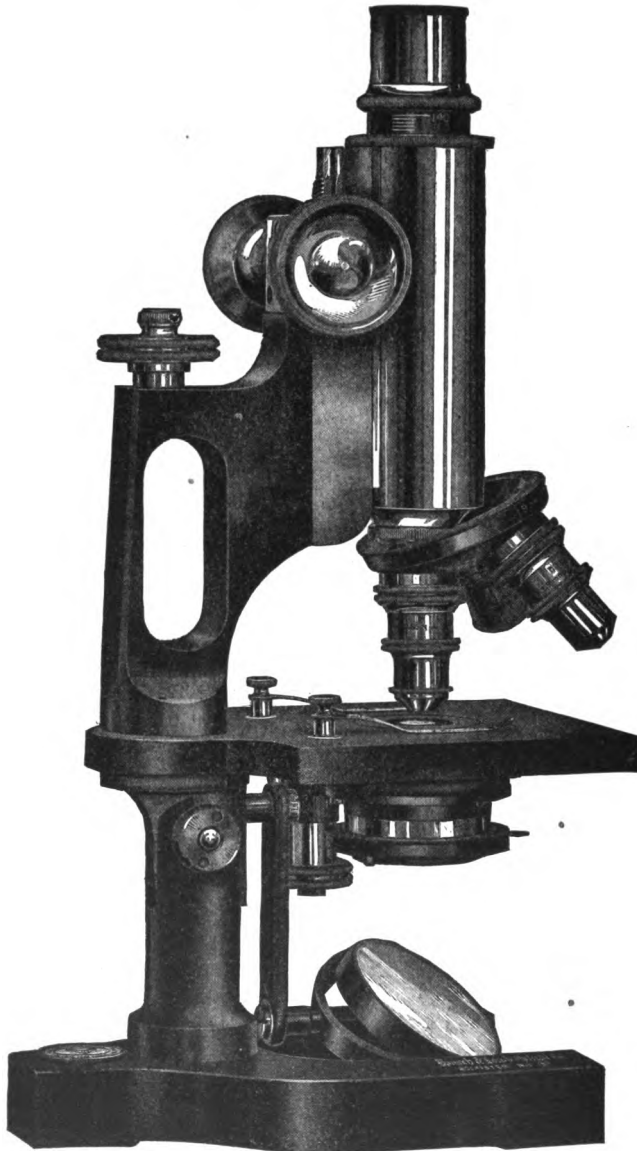
Finish—Main parts, including body tube, in alcohol proof black; adjustment heads and buttons in yellow.

Case—Of hard wood with polished finish; fitted with brass lock and key.

No. 2710

Cat. No.	OBJECTIVES		Eyepieces	Nosepieces	Abbe Condenser	Price
	Dry	Oil Immersion				
DDH 1	16 mm. 4 mm.	.....	7.5×	.....	1.20 N. A.	\$131.00
DDH 2	16 mm. 4 mm.	.....	7.5×	Circular Double	1.20 N. A.	135.00
DDH 3	16 mm. 4 mm.	.....	5× 10×	.....	1.20 N. A.	132.50
DDH 4	16 mm. 4 mm.	.....	5× 10×	Circular Double	1.20 N. A.	136.50
DDH 8	16 mm. 4 mm.	1.9 mm.	5× 10×	Circular Triple	1.20 N. A.	165.00

Plain stage for DDH, vulcanite covered.....\$15.00

MICROSCOPES**TYPE BH 8**

No. 2714
(.5 Actual Size)

For description, dimensions, prices, etc., see following page.

MICROSCOPES

TYPE BH

The focusing adjustment is a coarse adjustment by standard rack and pinion; fine adjustment of the lever type with two-sized knurled head for slow and rapid movement.

FINISH.—Body tube, with connections, and pinion buttons in yellow; other parts, including draw tubes, unless metal fitted, in black. Black body tubes will be furnished in place of yellow, if so specified, at no additional cost.

No. 2712

Cat. No.	Objectives	Dry	Eyepieces	Nosepieces	Price
BH 1	16 mm	4 mm	7.5 ×		\$27.50
BH 2	16 mm	4 mm	7.5 ×	Circular Double	31.50
BH 3	16 mm	4 mm	5 × 10 ×		29.00
BH 4	16 mm	4 mm	5 × 10 ×	Circular Double	33.00

TYPE BH 8

This instrument is the same as our regular microscope BH with the addition of a substage, adjustable for focus by a quick acting screw.

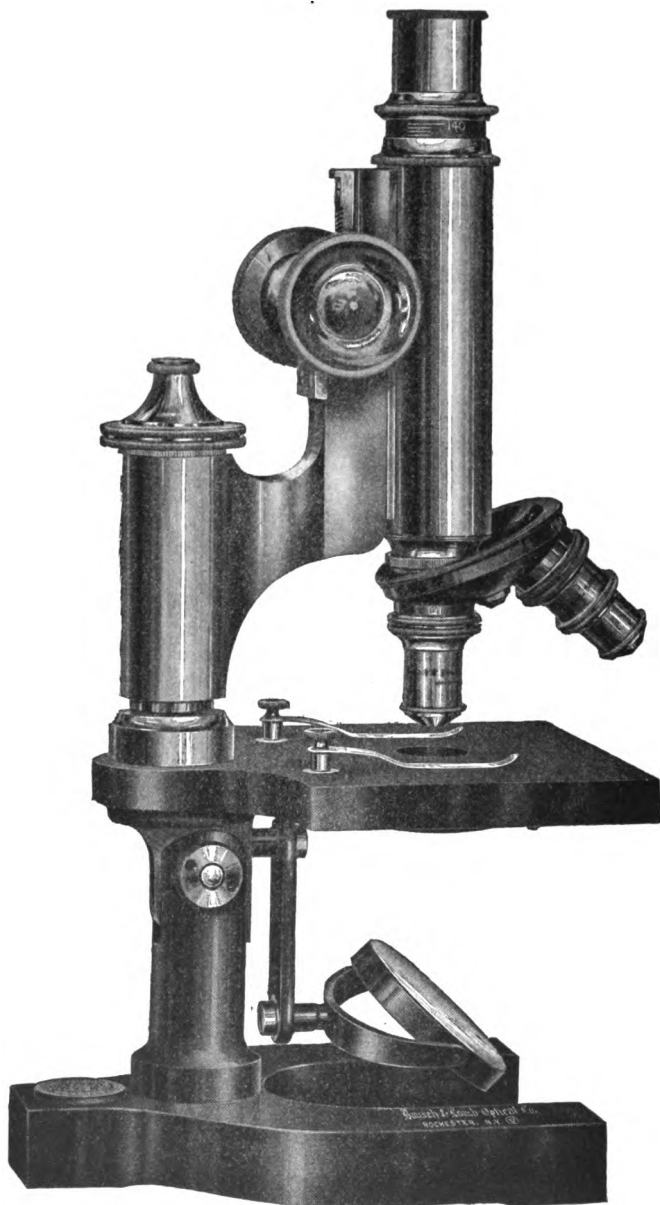
The substage consists of a mounting for the Abbe condenser and an iris diaphragm, which comes into the plane of the stage when the screw is turned up as far as possible, allowing the condenser to be used in immersion contact with the objective, if desired.

The substage is swung to the left of the optical axis when the screw reaches the limit of motion downward.

No. 2714

Cat No.	OBJECTIVES		Eyepieces	Nosepiece	Abbe	Price
	Dry	Oil Immersion			Condenser	
BH 8	16 mm 4 mm	1.9 mm	5× 10×	Circular Triple	1.20 N.A.	\$70.00

MICROSCOPES TYPE BA



No. 2716
(.5 Actual Size)

For description, dimensions, prices, etc., see following page.

MICROSCOPES

TYPE BA

Base—Horseshoe form.

Pillar—Round; provided with inclination joint, having vertical and horizontal stops.

Arm—Round, of standard design; base grooved for attachment of Bausch & Lomb mechanical stage A; provides ample space for manipulation of object.

Body Tube—Outside diameter, 32 mm; provided with society screw thread; standard size eyepieces are used; draw tube graduated in single millimeters with every tenth line numbered, adjustable in cloth-lined sleeve, **or in metal fitting, if so specified**, and provided with society screw thread for the use of low power objectives.

Focusing Adjustment—Coarse adjustment by standard rack and pinion; fine adjustment of prism form with two-sized knurled head for slow and rapid movement.

Stage—Of metal, covered with vulcanized rubber; measures 101 x 101 mm, with a distance of 57 mm from center to base of arm; provided with spring clips, an iris diaphragm and screw threads for attaching a substage ring to hold an Abbe condenser.

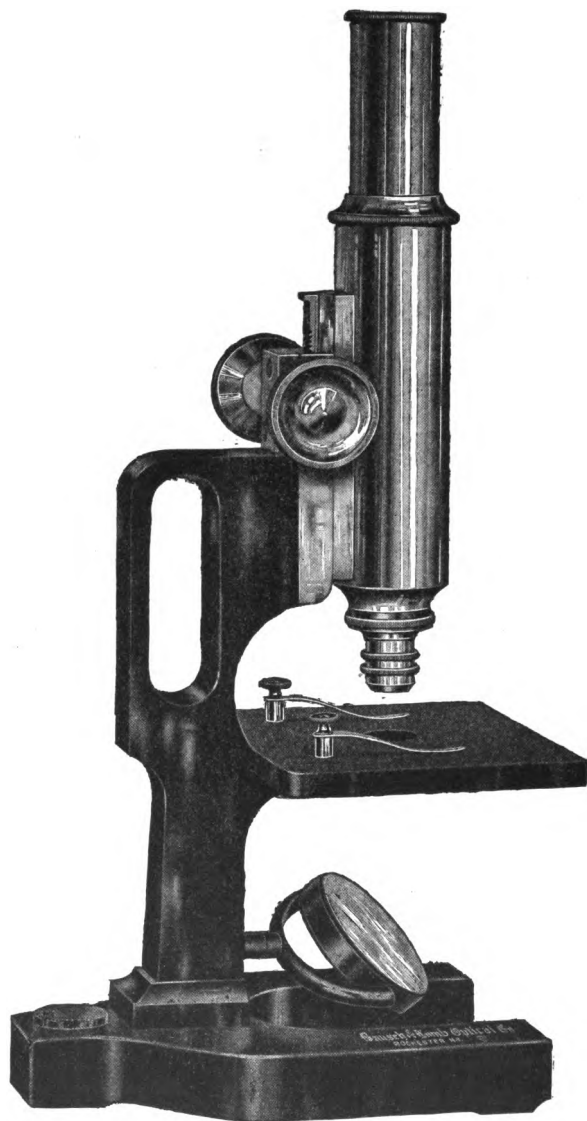
Mirror—Plane and concave, 50 mm in diameter; adjustable in two planes in a fork, mounted on a swinging arm for oblique illumination.

Finish—Body tube, arm and pinion buttons in yellow; other parts, including draw tube unless metal fitted, in black, iris diaphragm controlled by knurled ring operated from any point of its circumference.

Case—Of hard wood with polished finish; fitted with brass lock and key.

No. 2716

	Objectives			
	Dry	Eyeieces	Nosepieces	Price
BA 1	16 mm. 4 mm.	7.5×		\$27.50
BA 2	16 mm. 4 mm.	7.5×	Circular Double	31.50
BA 3	16 mm. 4 mm.	5× 10×		29.00
BA 4	16 mm. 4 mm.	5× 10×	Circular Double	33.00

MICROSCOPES**TYPE A**

No. 2718
(.5 Actual Size)

For description, dimensions, prices, etc., see following page.

MICROSCOPES

TYPE A

Base—Horse-shoe form.

Pillar—Rectangular; of one piece with arm.

Arm—Of handle type.

Body Tube—Outside diameter, 32 mm; fixed length, 160 mm; standard size eyepieces are used.

Focusing Attachment—By standard rack and pinion, coarse adjustment only; not recommended for objectives of shorter focus than 8 mm.

Stage—Of blackened metal, 100 by 83 mm, with a distance of 42 mm from center to base of arm; provided with spring clips and a revolving diaphragm, containing four apertures of different sizes.

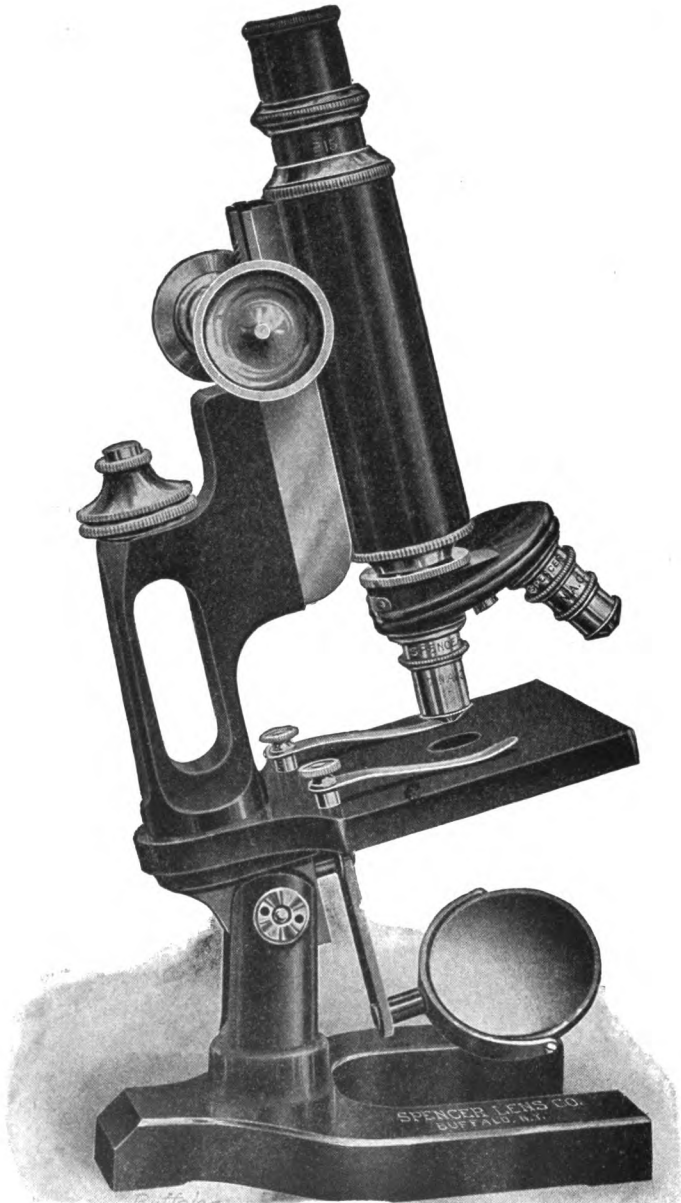
Mirror—Plane and concave, 50 mm in diameter; adjustable in two planes in a fork mounting, attached to the microscope pillar.

Finish—Body tube, with connections, and pinion buttons in yellow; other parts in black.

Case—Of wood, neatly finished and fitted with catch. If lock is desired, \$1.00 should be added to list price.

	Objectives Dry Divisible	Eye-piece	Price
2718	16+32	7.5×	\$18.00

• MICROSCOPES
STYLE No. 66



No. 2720

For general description, prices, etc., see following page.

MICROSCOPES

STYLE No. 66

2720 The No. 66 microscope has proved so popular that we have improved it to give our patrons the advantage of a larger instrument. The stage of No. 66 is now the same size as that of No. 46, there being a free distance of 55 mm. from the optical axis to the base of the arm.

The vulcanite covers the whole of the top of the brass stage and the edges as well. It is vulcanized directly to the brass, which has been claimed and recognized for years as being superior to stages where the vulcanite plates are simply screwed to the stage. This makes a more durable stage and better finish. The iris diaphragm in the stage is operated by a knurled ring, which can be reached from any side.

Provision is made for easily attaching a substage ring for condenser when so desired.

The base and pillar are strong and rigid and are provided with inclination joint.

The tube, rack and pinion, new circular nosepiece, mirror, optical parts, etc., are the same as used on our higher-priced instruments.

In neat hardwood cabinet — mahogany finish.

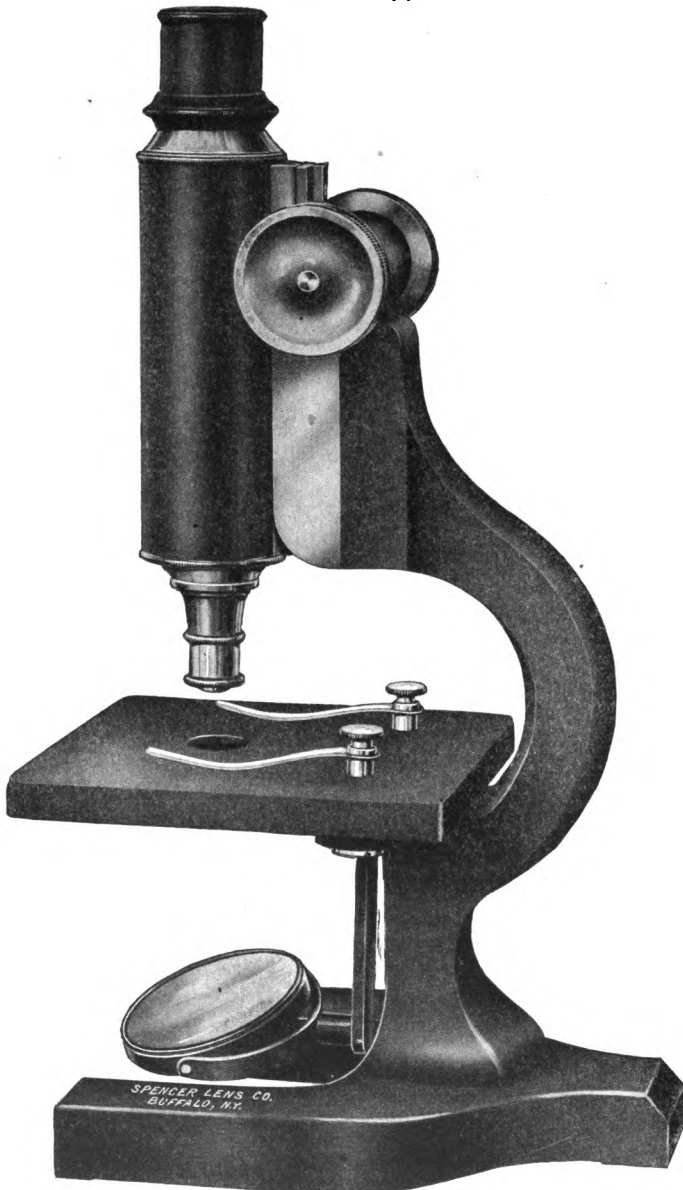
Style No.	Condenser	Nosepiece	Achromatic Objectives Equiv. Foc. mm.	Huyghenian Oculars	Price
66A	.....	.....	16, 4	8x	\$27.50
66B	.....	Double	16, 4	8x	31.50
66C	.....	.....	16, 4	4x, 8x	29.00
66D	.....	Double	16, 4	4x, 8x	33.00
66E	N. A. 1.20	Double	16, 4	8x	39.00
66F	N. A. 1.20	Double	16, 4	4x, 8x	40.50
66H	N. A. 1.20	Triple	16, 4, 1.8	4x, 8x	65.00
			Oil-imm.		

We substitute the 2 mm. oil-immersion objective when it is wanted.

The quick-screw substage like that on No. 46 can be added to this instrument at an additional charge of \$5.00.

MICROSCOPES

STYLE No. 74

**No. 2722****For general description, prices, etc., see following page.**

MICROSCOPES

STYLE No. 74

2722 An inexpensive, but exceedingly well-made instrument, especially intended for the examination of any substances that do not require a very high power, as, for example, starches, drugs, earths, cements and other commercial articles, such as fibers and fabrics, meat for suspected parasites, paper-making materials, prints, etc. It will be found exceedingly satisfactory for work in elementary zoology and botany as taught in common schools and for examination of insect and plant life. No better gift can be placed in the hands of an inquiring boy or girl who is beginning the study of animal or plant life.

For all commercial, household or elementary school purposes this microscope affords a wide field of usefulness and pleasure.

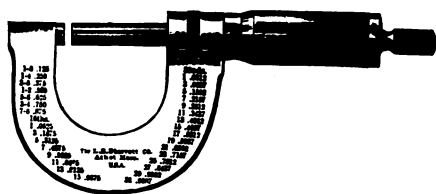
In hardwood cabinet.

Style No.	Nose Piece	Achromatic Objectives Equiv. Foc. mm.	Oculars	Price
74X	.....	Divisible 32-14	8x	\$17.50
74Y	.....	Divisible 32-14		
		Special 5	4x, 8x	23.00
74Z	Double	Divisible 32-14		
		Special 5	4x, 8x	27.00
74A	.....	16, 4	8x	25.50
74B	Double	16, 4	8x	29.50

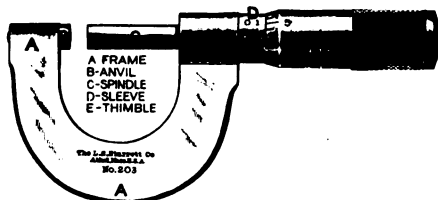
The divisible objective (32 mm. and 14 mm.) gives with the 4x eyepiece, magnifications of 17 and 65 diameters; with the 8x eyepiece, 35 and 130 diameters.

NOTE—We can quote you on microscope accessories upon request.

MICROMETERS



No. 2724



No. 2724

- 2724 Micrometers. For measurement by thousandths up to 1 inch. Has lock-nut and ratchet stop..... \$6.00
In leather case 6.50

HOW TO READ A MICROMETER

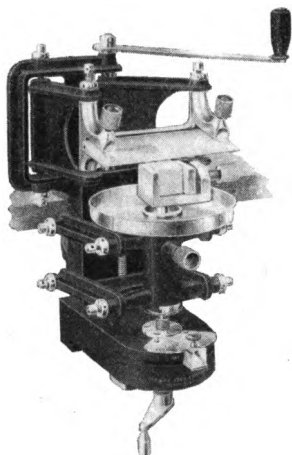
The spindle C is attached to the thimble E at the point H. The part of the spindle which is concealed within the sleeve and thimble is threaded to fit a nut in the frame A. The frame being held stationary, the thimble E is revolved by the thumb and finger, and the spindle C being attached to the thimble revolves with it, and moves thru the nut in the frame, approaching or receding from the anvil B. The article to be measured is placed between the anvil B and the spindle C. The measurement of the opening between the anvil B and the spindle C. The measurement of the opening between the anvil and the spindle is shown by the lines and figures on the sleeve D and the thimble E.

The pitch of the screw threads on the concealed part of the spindle is 40 to an inch. One complete revolution of the spindle therefore moves it longitudinally one fortieth (or twenty-five thousandths) of an inch. The sleeve D is marked with 40 lines to the inch, corresponding to the number of threads on the spindle. When the micrometer is closed, the beveled edge of the thimble coincides with the line marked 0 on the sleeve, and the 0 line on the thimble agrees with the horizontal line on the sleeve. Open the micrometer by revolving the thimble one full revolution, or until the 0 line on the thimble again coincides with the horizontal line on the sleeve; the distance between the anvil B and the spindle C is then $\frac{1}{40}$ or (.025) of an inch, and the beveled edge of the thimble will coincide with the second vertical line on the sleeve. Each vertical line on the sleeve indicates a distance of $\frac{1}{40}$ of an inch. Every fourth line is made longer than the others, and is numbered 0, 1, 2, 3, etc. Each numbered line indicates a distance of four times $\frac{1}{40}$ of an inch, or one tenth.

The beveled edge of the thimble is marked in twenty-five divisions, and every fifth line is numbered, from 0 to 25. Rotating the thimble from one of these marks to the next moves the spindle longitudinally $\frac{1}{25}$ of twenty-five thousandths, or one thousandth of an inch. Rotating it two divisions indicates two thousandths, etc. Twenty-five divisions will indicate a complete revolution, .025 or $\frac{1}{40}$ of an inch.

To read the micrometer, therefore, multiply the number of vertical divisions visible on the sleeve by 25, and add the number of divisions on the bevel of the thimble, from 0 to the line which coincides with the horizontal line on the sleeve. For example, as the tool is represented in the engraving, there are seven divisions visible on the sleeve. Multiply this number by 25, and add the number of divisions shown on the bevel of the thimble, 3. The micrometer is open one hundred and seventy-eight thousandths. ($7 \times 25 = 175 + 3 = 178$.)

MICROTOMES



Automatic
No. 2726

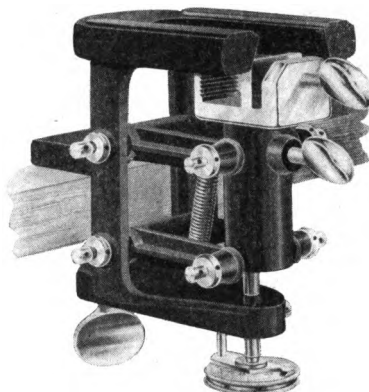


Table
No. 2728

AUTOMATIC

2726 In this microtome the main supporting frame has a heavy clamp at the back by which it is securely fastened to the laboratory table. As will be seen by the cut, the upper part of this frame forms a support to which the two laterally swinging arms are attached by steel pivot screws with check nuts.

The knife carrier is held by these swinging arms at their outer ends, attached thereto by similar pivot screws with check nuts, and in order to give the proper movement, relieved from any pressure or strain, a detachable flexible lever handle is attached to the axis fastened to the longer arm on which the arm swings.

The extreme ends of the knife rest in the holder, and as the lever moves the swinging arms the blade describes the flattened curve, corresponding to the double movement in the free-hand sectioning. By this manner of holding the knife by arms which are not parallel, the entire length of its cutting edge is utilized, insuring uniform wear and permitting the cutting of larger sections than has heretofore been possible, except by using a very much larger blade. The swinging arms and knife holder are sufficiently rigid to avoid any deflection of the knife in its movements, thereby assuring an absolute uniformity of thickness in all the sections.

Price, without Freezing Attachment.....\$45.00

TABLE

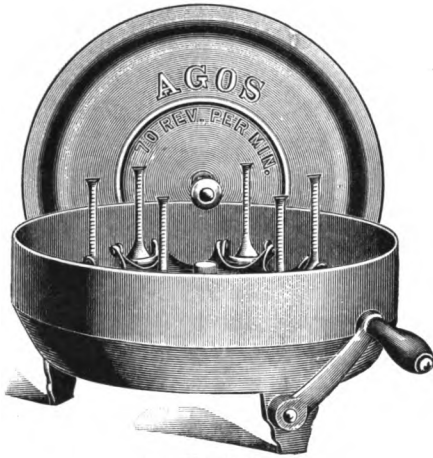
2728 As will be seen from the engraving, this may be firmly attached by a screw-clamp to the laboratory table or other support. The round shank of the object clamp for paraffin blocks sets in a vertically movable socket, held by hardened steel pivot screws in two vertically swinging arms which are similarly attached to the main frame, thus providing a movement upon the parallelogram principle regulated by a micrometer screw with graduated disc and index plate by which any desired thickness of sections may be cut. Glass surface plates provide traveling ways upon which the knife slides. These are extra long, so that the knife will not be drawn off from the ends, thereby endangering its edge.

Price, without Knife.....\$12.50

All other sizes and styles quoted on request. Quotations on all microscope accessories made upon application.

MILK TESTING APPARATUS

THE "AGOS" CAST IRON FRAME HAND BABCOCK TESTER



No. 2730

2730 The "Agos" Hand Babcock Tester is a perfect hand tester. It has cast iron body and cover with machine cut spur and spiral gearing teeth. The bottle head is of malleable iron; seamless brass swinging pockets, and strong rings allow the bottles to swing perfectly horizontal when in motion. Ball bearings make it turn easier and run more smoothly and quietly than others.

The Hand "Agos" is similar to the Steam Turbine "Agos" which is so popular

among its many users, and is sure to give satisfaction to all those who desire a perfectly accurate, efficient, simple, durable hand tester.

The gearing is so arranged that a very high speed is obtained easily, which is one of the most important requisites of a tester.

The "Agos" Tester takes up little room and uses either the ordinary Babcock bottle, the "Wagner" or the "Ohlsson" Patent Bottles.

They are made in five sizes as follows:

4 bottles.....	\$ 8.00	10 bottles.....	\$12.00
6 bottles.....	9.00	12 bottles.....	14.00
8 bottles.....	10.00	Shipping weight, about 85 lbs.	

With each tester is furnished the following outfit, viz:—

Full set of regular Babcock milk bottles, pipette, acid measure, acid sufficient for making 50 to 100 tests, and directions for manipulating. All testers are fitted with the ordinary milk bottles unless different bottles are ordered.

THE ALKALINE TABLET TEST

A simple and accurate method of determining the acidity of cream, milk, or buttermilk. Particularly is it adapted for testing the acidity or proper sourness of cream for churning.

Perfectly uniform results as to flavor and quality of butter can be obtained only with this system.

PRICE

Complete Set with sample package of Tablets	\$2.75
Tablets, per 1,000	2.00
Graduated Cylinder, 100 c.c. ....	.75
Pipette, 17.6 cc. ....	.20
Porcelain Cup .....	.10

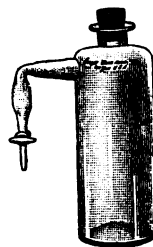
MILK TESTING APPARATUS



No. 2732

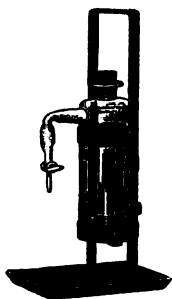


No. 2738



No. 2746

2732	Test Bottle, Babcock's.	For milk. Graduated to 10% in $\frac{1}{4}$ %.	
	Each.....		\$0.15
	Per dozen.....		1.20
2734	Test Bottle, Babcock's.	For cream. Graduated to 30 % in $\frac{1}{2}$ %.	
	Each.....		.25
	Per dozen.....		2.00
2736	Test Bottle, Babcock's.	For cream. Graduated to 50 % in 1 %.	
	Each.....		.25
	Per dozen.....		2.00
2738	Test Bottle.	For skim milk, with double bore.	
	Graduated in 1-20 %.....	each	.60
	Graduated in 1-100 %.....	each	.75
2740	Funnels.	For test bottles.....	each, net
2742	Acid Measure, 17.5 cc.....		.20
2744	Acid Pipette, 17.5 cc.....		.20
2746	Acid Bottle.	With 17.5 cc. pipette and stopcock. A very simple and practical measure.....	each 3.00



No. 2748



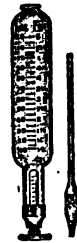
No. 2750

2748	Acid Bottle Tilting Machine.	For acid bottles, with a lead-lined protecting base, as used by the Illinois State Food Laboratory. Very handy, rapid and convenient. With bottle.....	each 8.00
		Without bottle.....	each 5.00
2750	Acid Pipette, Automatic, Farrington's.	Delivers 17.6 cc.; complete as shown, with pipette, rubber bulb and connections.....	each 4.50

MILK TESTING APPARATUS



No. 2752

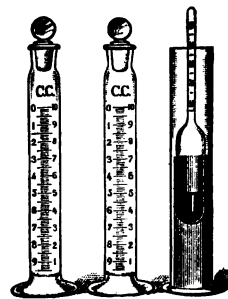


No. 2764

2752	Creamometers. To show the percentage of cream.....	\$1.00
2754	Lactometers. With mark indicating "Good Milk," " $\frac{1}{4}$ water," " $\frac{1}{2}$ water," and " $\frac{3}{4}$ water.".....	.75
2756	Lactometers, N. Y. Board of Health.....	.50
2758	Lactometers, N. Y. Board of Health. With thermometer.....	2.00
2760	Lactodensimeters, Quevenne's. Indicating specific weight.....	1.00
2762	Lactodensimeters, Quevenne's. With thermometer sealed-in, reaching above surface of milk.....	2.00
2764	Lactoscopes, Feser's. For rapid determination of fat, with pipette and directions in case.....	5.50



No. 2766



No. 2774

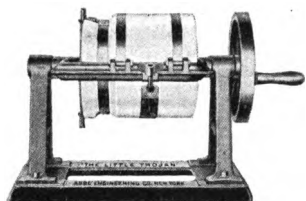
2766	Lactobutyrometers, Marchand's. On foot.....	\$1.00
2768	Pioscope, Heeren's. Color tester.....	1.00
2770	Hofmeister's Dishes. For evaporating, of very thin glass.....	.15
2772	Dishes, Aluminum. For milk analysis.	
	Size, 2-inch diameter, $\frac{1}{2}$ -inch high, each.....	.25
	Size, 2 $\frac{1}{2}$ -inch diameter, $\frac{5}{8}$ -inch high, each.....	.30
2774	Milk Testers, Holt's. For testing "Human Milk," consisting of two graduated cylinders, with glass stoppers, one lactometer and cylinder for same in box.....	3.00
2776	Milk Absorbing Paper, Adam's. Absolutely fat free, in strips, 6.5x56 ctm., fifty in a package, per package.....	1.75

See also Extraction Apparatus, pages 188, 189.

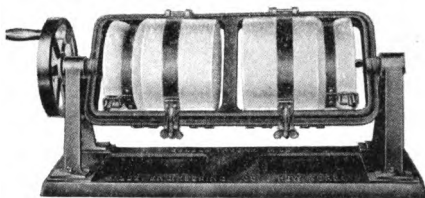
MILLS AND MORTARS

BALL MILLS

(Laboratory Sizes.)



No. 2778
SINGLE



No. 2780
DOUBLE

TROJAN MILLS

In presenting these Laboratory Mills, we desire to call special attention to the fact that the porcelain jars of these machines are "Imported," that they are manufactured from the finest raw materials obtainable, made in the plastic state, thus forming jars that are impervious to the actions of even such materials as ink. These jars are of so superior a quality that constant use of them has never worn them out.

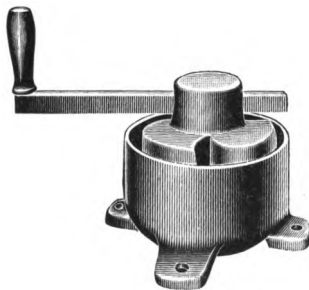
2778 The jar measures, outside, 8.75 x 9.65 inches, will handle from a few ounces up to 5 pounds at a charge; shipping weight, 120 pounds; floor space, 10½ x 25 inches. Hand wheel-pulley, 9 x 1 inches, 60 R.P.M.

Price.....\$30.00

2780 For two jars; shipping weight, 195 pounds; floor space, 10½ x 38 inches. Hand wheel-pulleys, 9 x 1 inches, 60 R. P. M. The sample jar measures, outside, 5.2 x 5.71 inches. Will handle from ¼ oz. to 1½ lbs. at a time. The laboratory jars measure 8.75 x 9.65 inches. Will handle from a few ounces up to 5 pounds at a time. Charges of material for all these mills are based on sand as a unit.

Price.....\$50.00

For some very hard materials we furnish Steel Balls with these mills instead of Flint Pebbles. Larger sizes quoted on application.



No. 2782

2782 Mortars, Buck's improved, of iron, especially adapted for grinding and amalgamating. Through the manner in which the muller is constructed, the contents of the mortar again pass under the muller.

Diameter.....	inches	6½	8½
Weight.....	pounds	30	76
Weight Muller	pounds	16	49
Price.....	each	\$7.50	\$10.00

MORTARS



No. 2784



No. 2786

2784 Mortars, Porcelain. Shallow form. Best make, with lip, rough inside; pestle all porcelain.

Capacity.....oz.	1½	2	3	6	10	16	22	32
Diameter.....in.	2½	2¾	3¼	4	4½	5½	6½	7½
Each.....	\$0.25	.30	.40	.50	.60	.80	1.00	1.25

2786 Mortars, Wedgewood. Best quality; pestle with wooden handle.

No.....	0000	000	00	0	1	2	3	4
Diameter.....in.	3	3¼	3½	4	4½	5	6	6½
Capacity.....oz.	2	3	4	6	11	16	24	30
Each.....	\$0.35	.40	.45	.50	.60	.70	.85	1.00
No.....	5	6	7	8	9	10	12	
Diameter.....in.	7	8	8½	9½	10½	12	14	
Capacity.....	40 oz.	48 oz.	3½ pts.	4½ pts.	7 pts.	10 pts.	17 pts.	
Each.....	\$1.25	1.50	1.80	2.25	3.00	3.75	5.00	



No. 2788



No. 2790

2788 Mortars, Iron. No. 1, high style. Best quality, for powdering ore.

Capacity.....	1 pt.	1 qt.	2 qts.	1 gal.	2 gal.	3 gal.
Each.....	\$0.50	.75	1.00	2.00	3.75	5.00

2790 Mortars, Iron. No. 2, low style. Best quality.

Capacity.....	1 qt.	2 qts.	1 gal.	2 gal.
Each.....	\$1.00	1.50	2.50	5.00

MORTARS



No. 2792



No. 2794



No. 2796

2792 **Mortars, Agate.** With pestles; best quality.

Diameter.....inches	1½	2	2½	3	3½	4
Each.....	\$1.50	2.25	3.50	5.00	8.00	9.50
Diameter.....inches	4¼	4½	5	5½	6	
Each.....	\$11.00	14.00	18.00	25.00	35.00	

2794 **Mortars, Diamond, Plattner's.** For crushing small quantities of ore for flattening silver buttons; made of the best tool steel, hardened and well finished.

Size.....	Small	Large
Each.....	\$3.50	5.50

2796 **Mortars, Diamond, Leeds.** Of hardened steel..... \$2.00



No. 2798



No. 2800

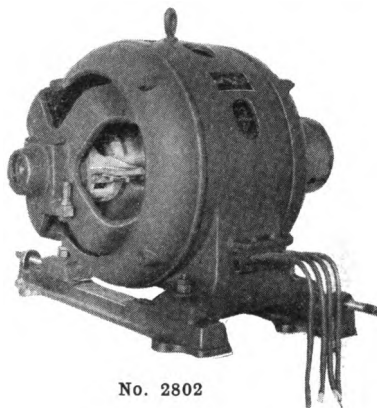
2798 **Mortars, Steel.** Polished inside and out; with pestle.

Diameter.....inches	3½	4½	5½
Each.....	\$1.75	2.25	3.00

2800 **Mortars, Glass.** With lip and pestle.

Capacity.....oz.	2	4	8	16	32
Each.....	\$0.25	.30	.35	.50	.80

WAGNER MOTORS



No. 2802

SINGLE-PHASE

A few salient points regarding these motors, and single-phase in general:

1. High starting efficiency.
2. The current demands at starting may be regulated in accordance with the actual load requirements.
3. Minimum maintenance cost.
4. Control is simplicity itself, a double-pole switch being all that is required.
5. The motor may be operated (started and stopped) a considerable distance, a mile or several miles, from the place of location.
6. Polyphase generation and single-phase distribution is now recognized as modern practice.

60 CYCLES

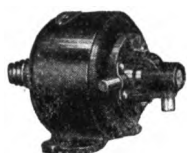
Horse Power	Full Load Speed R. P. M.	MOTOR WITH STANDARD PULLEY AND RAILS INTERCHANGEABLE 110-115 V. or 200-230 V.
$\frac{1}{4}$	3500	\$155.00
$\frac{1}{4}$	1750	105.00
$\frac{1}{4}$	1165	123.00
$\frac{1}{4}$	1165	135.00
$\frac{1}{2}$	3500	166.00
$\frac{1}{2}$	1750	120.00
$\frac{1}{2}$	1165	160.00
$\frac{3}{4}$	3500	187.00
$\frac{3}{4}$	1750	143.00
1	3500	207.00
1	1750	162.00
1	1165	220.00
2	3500	215.00
2	1750	220.00
2	1165	276.00
2	870	357.00
3	3500	275.00
3	1750	275.00
3	1165	330.00

5% The first eleven motors if ordered for 100-115 volts only are subject to an additional discount.

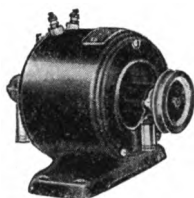
Also: Polyphase motors A. C. generators transformers, instruments, rectifiers.

MOTORS

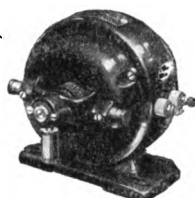
STANDARD ELECTRIC MOTORS



1-30 H. P.



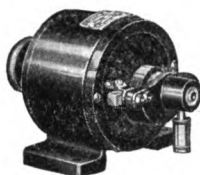
1-16 H. P.



1-12 H. P.



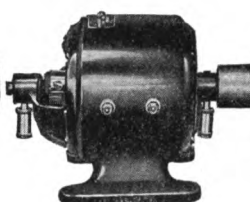
1-10 H. P.



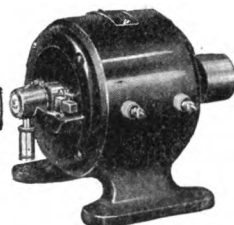
1-8 H. P.



1-6 H. P.



1-4 H. P.



1 H. P.

Nos. 2804-2806

2804 **Motors, Electric.** These Motors are designed for direct current, are of the very highest class and guaranteed.

H. P.	R. P. M.	Volts	Price
$\frac{1}{30}$	1000	115	\$16.25
$\frac{1}{20}$	1500	115	16.25
$\frac{1}{15}$	2000	115	16.25
$\frac{1}{12}$	1500	115	16.25
$\frac{1}{10}$	3000	115	16.25
$\frac{1}{8}$	2000	115	16.25
$\frac{1}{6}$	2300	115	19.50
$\frac{1}{4}$	2000	115	33.25

2806 **Motors, Electric, for alternating current.**

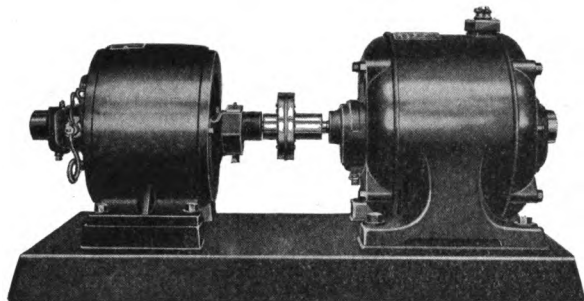
H. P.	R. P. M.	Voltage	Price
$\frac{1}{4}$	1750	220-440	\$35.00
$\frac{1}{2}$	1750	220-440	43.00
$\frac{3}{4}$	1750	220-440	49.00
1	1750	220-440	54.00
2	1750	220-440	67.00

All above Motors subject to discount.

NOTE. — We can furnish Motors of any capacity or voltage, either alternating or direct current. In ordering, give full particulars. Write us for full information and quotations.

MOTORS

MOTOR GENERATORS



No. 2808

2808 Motor Generators. A great many laboratories have available 60 to 125 cycle alternating current at 110 or 220 volts. For such the motor generator is the most satisfactory machine for producing the proper direct current for laboratory work. These sets consist of an alternating current motor coupled to a direct current generator, as shown in cut. A driving pulley can be placed on the driving shaft next to the coupling without extra charge.

Motor A. C. H. P.	Generator Watts	Motor A. C.	VOLTAGE	Generator D. C.
$\frac{1}{6}$	60	110		6-125
$\frac{1}{6}$	60	220		6-125
$\frac{1}{4}$	120	110		6-125
$\frac{1}{4}$	120	220		6-125
$\frac{1}{2}$	175	110		6-125
$\frac{1}{2}$	175	220		6-125
$\frac{1}{2}$	250	110		6-125
$\frac{1}{2}$	250	220		6-125
1	500	110		6-125
1	500	220		6-125

Prices and full information on application.



No. 2810

2810 Water Motor, Rabes', for water, vapor or expanded air. This motor can be attached to an ordinary apparatus stand and used for either stirring or shaking. Revolutions attained according to water pressures as follows:

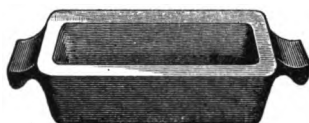
20	30	40	50	60	lbs. Water Pressure.
2300	2800	3400	3850	4200	R. P. M.

Price.....each \$5.00

MOULDS



No. 2814



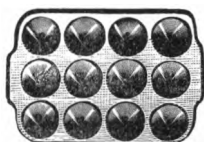
No. 2816



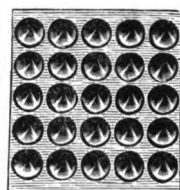
No. 2818



No. 2820



Nos. 2822-2824



No. 2828

2812	Moulds, Ingot or Bullion.	Inside diameter, 1x1x3½ inches, capacity 35 oz. gold, 18 oz. silver.....	\$ 0.60
2814	Moulds, Ingot or Bullion.	Inside diameter, 1½x1½x8 inches, with sliding bar to cast any length desired, capacity, 150 oz. gold, 750 oz. silver.....	1.25
2816	Moulds, Ingot or Bullion.	Capacity of moulds is figured filled to within about ⅛ inch of top.	
	Size	inches 3½x1x1 3½x1½x1½ 4x2x2 5½x2½x2½ 6½x3¼x3¼	
	Capacity, gold..oz.	20 50 100 250 500	
	Capacity, silver.oz.	10 25 56 140 275	
	Each.....	\$0.75 1.00 1.25 2.00 2.50	
	Size.....	inches 9x3¾x3¾ 11x4¾x4¾ 11½x5½x4½ 15x7x6	
	Capacity, gold..oz.	1000 2000 2500 5000	
	Capacity, silver.oz.	550 1100 1350 3000	
	Each.....	\$3.50 5.50 6.50 7.50	
	Lettering on above moulds, per letter.....		\$0.06
2818	Moulds, Pouring.	Iron, with 3 conical depressions, bottom running down to a fine point, wood handle, for lead or scorification.....	.75
2820	Moulds, Pouring.	Iron, with 6 conical depressions and handle, bottom running down to a fine point, for scorification.....	.75
2822	Moulds, Pouring.	Iron, with 12 conical depressions, 2½-inch diameter, 1-inch deep; for crucible or scorification assays.....	1.00
2824	Moulds.	Same with 12 conical depressions, 3-inch diameter, 1½-inch deep, for crucible or scorification assays.....	1.75
2826	Moulds.	Same with 20 conical depressions, 2½-inch diameter, 1-inch deep, for crucible or scorification assays.....	2.00
2828	Moulds, Pouring.	Cast iron with 25 spherical depressions, for crucible or scorification assays.....	1.50

MOULDS



No. 2830



No. 2832



No. 2836



No. 2838



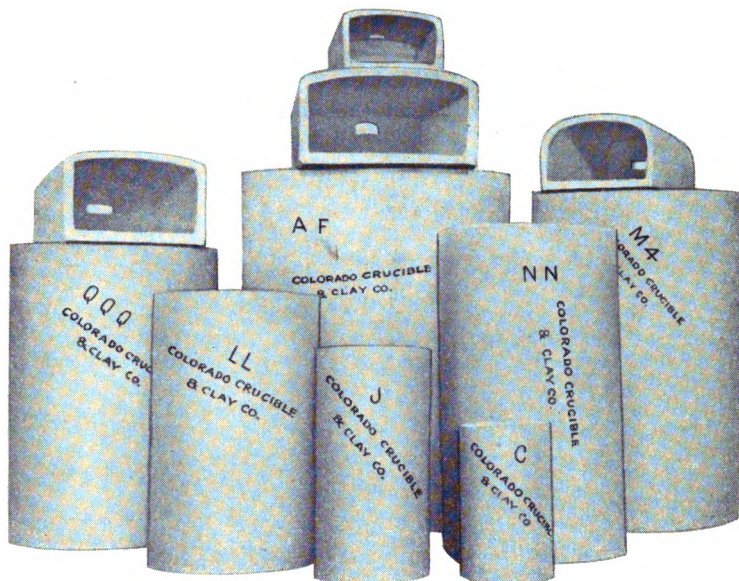
No. 2840

- 2830 **Moulds, Pouring.** Heavy, solid iron, with 2 conical depressions, $2\frac{1}{8}$ inches diameter, $1\frac{5}{8}$ inches deep, wood handles, for crucible and scori-
fication assays, each..... \$1.50
- 2832 **Moulds, Pouring.** Heavy, solid iron, with 6 conical depressions, $2\frac{1}{4}$
inches diameter, $1\frac{5}{8}$ inches deep, solid iron handle. The slag will
cool rapidly, each..... 3.00
- 2834 **Moulds, Pouring.** Same as above, but with 8 depressions, each..... 5.00
- 2836 **Moulds, Pouring.** As above, with 6 conical depressions, 2 inches diameter,
 $1\frac{1}{2}$ inches deep, with iron ring handle, each..... 3.00
- 2838 **Moulds, Pouring.** For large crucibles, one only large depression, 6 inches
diameter, 5 inches deep, each..... .80
- 2840 **Moulds, Pouring.**

	Weight Lbs.	Price Each
For Black Lead Crucible No. 7	16	\$2.25
For Black Lead Crucible No. 10	27	4.00
For Black Lead Crucible No. 16	35	5.00
For Black Lead Crucible No. 25	50	6.50
For Black Lead Crucible No. 35	60	7.50
For Black Lead Crucible No. 50	85	8.75
For Black Lead Crucible No. 80	105	10.00
For Black Lead Crucible No. 100 or 125	135	12.00

Moulds, Cupel. See under Cupels, pages 166-169.

MUFFLES



No. 2842

Our muffles, manufactured by the Colorado Crucible & Clay Company (for whom we are sole agents), are the very highest standard for these goods. They are made of Colorado Clay, (renowned throughout the world) by skilled ceramists of years of experience.

We have no hesitancy in recommending them, and will stand behind their quality to the utmost.

In ordering, please give the designating letter and the number; and it is also wise as an additional precaution to give the outside dimensions.

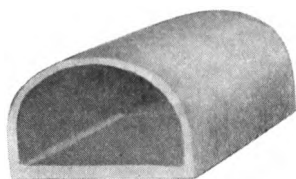
The list on the following page gives the standard sizes, and no difficulty should be had in selecting one to meet the requirements of everyone. Besides this list, we have many special muffles in stock. Moreover, we are glad to make special muffles according to special ideas or requirements as reasonably and quickly as possible. In ordering such special muffles, be careful to give complete information; not only dimensions, but the shape of the opening into which the muffle is to fit is needed. Also give the particulars as to the ventilating holes.

MAXIMS FOR THE CARE OF MUFFLES

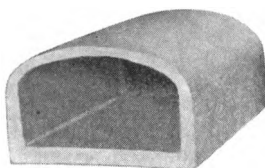
1. See that the muffle has a bearing on all supports, as otherwise very disastrous strains are put upon the muffle.
2. Muffles should be dry before being put into the furnace.
3. Considerable additional life may be gained from muffles by avoiding cold air draughts striking the muffles, either in front or outside through the fire box.
4. The muffle should not be heated or cooled more rapidly than necessary. It is well to shut up the furnace after the day's work is done, allowing it to cool slowly. These precautions are also good for the furnace.
5. If anything is spilled in the muffle, put bone ash on the spot quickly.

The Colorado Muffles will stand a great deal of abuse and radical changes in temperature, but by avoiding them and the strains incident thereto, the life of the muffle will be prolonged.

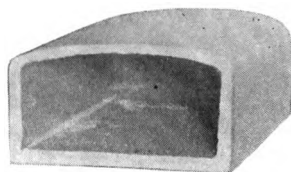
MUFFLES



SHAPE 2



SHAPE 3



SHAPE 4

No. 2842

COLORADO MUFFLES

OUTSIDE MEASUREMENTS
 Always Used in Specifying Muffles

INSIDE MEASUREMENTS
 For Determining Capacity

Letter	Width Inches	Length Inches	Height Inches	Shape	Width Inches	Side Height Inches	Greatest Height Inches	Price Each
AAA	2½	6	1⅞	2	...	...	...	\$0.50
AA	3	7	2¼	2	...	...	...	.50
BB	3½	6	2½	2	...	...	...	.50
CC	4¾	8	3	2	...	...	...	.60
C	4¾	8	3	2	...	...	...	.60
HH	5¼	7⅞	4¼	2	...	...	...	.60
H	5¼	10½	3⅞	2	...	...	...	.75
GE	6	6½	4¼	4	5	3¼	3½	.50
GC	6	8	3½	4	5¼	2¾	2⅞	.75
GF	6	10	4¼	4	5¾	3¼	3⅞	.75
CJ	6	12	4	2	4⅞	1¾	3¼	.90
CF	6	9	4	2	5¼	2	3½	.75
F	6	10	4	2	5¼	...	3⅞	.75
FF	6	10	4	3	5¼	...	3⅞	.75
J	6	12	4	3	4⅞	...	3⅞	.90
D	7	10	4¾	2	6	...	3½	.75
CD	7	10½	4¾	3	5⅞	...	3½	.75
DD	7	12	5	4	6⅞	3¾	4⅞	1.00
G	7	12	4½	3	6	2½	3⅞	1.00
GG	7	14	5	3	6	2¾	3⅞	1.20
GK	8	12	5¼	4	7⅞	3⅞	4⅞	1.15
KK	8	12	5	3	6⅞	2½	4	1.15
KKK	8	13	4⅞	2	6¾	...	3¾	1.20
K	8	14	5	3	7	2½	4	1.25
LLL	9	14½	5½	3	7⅞	2¾	4	1.50
L	9	15	5¾	3	7⅞	...	4½	1.50
LL	9	15	5¾	3	7¾	2¾	4⅞	1.50
FHN	9	16	6	3	7⅞	3¼	4¾	1.50
I	10	16	6½	2	8⅞	2⅞	5	1.75
GI	10	16	5½	4	9	3¾	4½	1.75
MH	10¼	16	6	2	8½	3½	4¾	1.75
HSS	10	16½	6⅞	2	8½	2½	5½	1.75
II	10	16	6¾	3	8½	3⅞	5⅞	1.75
CII	10	16½	6¾	3	8½	3⅞	5⅞	1.75
JJJ	10	18	6¼	3	8⅞	2⅞	5	2.00
NNN	10	19	6¼	3	8⅞	2⅞	5	2.15
MM	10	20	6¼	2	8⅞	2⅞	5	2.25
JJ	10¼	18	6¼	3	8¾	3⅞	5	2.00
N	10¼	19	6¼	3	8¾	3⅞	5	2.15

MUFFLES, COLORADO — Continued:

Letter	Width in.	Length in.	Height in.	Shape	Width in.	HEIGHT, INCHES		Each
						Side	Greatest	
M	10 $\frac{1}{4}$	20	6 $\frac{1}{4}$	3	8 $\frac{3}{4}$	3 $\frac{5}{8}$	5	\$2.25
LM	10 $\frac{1}{4}$	22	6 $\frac{1}{4}$	3	8 $\frac{3}{4}$	3 $\frac{5}{8}$	5	2.50
III	10 $\frac{1}{4}$	16 $\frac{1}{2}$	6 $\frac{1}{4}$	3	8 $\frac{3}{4}$	3 $\frac{5}{8}$	4 $\frac{7}{8}$	2.00
NN	10 $\frac{1}{2}$	19	6 $\frac{1}{2}$	3	8 $\frac{7}{8}$	3 $\frac{3}{4}$	5	2.15
RR	10 $\frac{1}{2}$	21	6 $\frac{1}{2}$	3	8 $\frac{7}{8}$	3 $\frac{3}{4}$	5 $\frac{1}{8}$	2.25
BNN	10 $\frac{3}{4}$	19	6 $\frac{7}{8}$	3	9	3 $\frac{3}{4}$	5 $\frac{1}{8}$	2.25
OO	11	16	7	3	9 $\frac{1}{2}$	3	5 $\frac{3}{8}$	2.10
PP	11	18	7 $\frac{1}{4}$	3	9 $\frac{3}{8}$	3 $\frac{1}{2}$	6	2.25
P	11	18	6 $\frac{1}{2}$	3	9 $\frac{3}{8}$	3 $\frac{5}{8}$	5 $\frac{1}{8}$	2.15
GET	11	19	7	3	9 $\frac{3}{8}$	.....	5 $\frac{3}{8}$	2.25
PPP	11	20	6 $\frac{1}{2}$	3	9 $\frac{3}{8}$	3 $\frac{5}{8}$	5 $\frac{1}{8}$	2.25
R	11 $\frac{1}{2}$	19	7 $\frac{1}{4}$	2	9 $\frac{7}{8}$	2 $\frac{1}{2}$	5 $\frac{3}{4}$	2.40
QVL	12 $\frac{1}{4}$	20 $\frac{1}{4}$	7 $\frac{1}{2}$	3	10 $\frac{1}{8}$	3 $\frac{3}{4}$	5 $\frac{3}{4}$	2.50
BQ	11 $\frac{3}{4}$	22 $\frac{1}{2}$	7	3	10	4	5 $\frac{3}{4}$	2.50
QQQ	12 $\frac{1}{4}$	18	7 $\frac{3}{4}$	3	10 $\frac{3}{4}$	3 $\frac{5}{8}$	6 $\frac{1}{8}$	2.50
QQ	12 $\frac{1}{4}$	19	7 $\frac{3}{4}$	3	10 $\frac{3}{4}$	3 $\frac{5}{8}$	6 $\frac{1}{8}$	2.50
Q	12 $\frac{1}{8}$	20	7 $\frac{1}{2}$	3	10 $\frac{1}{8}$	3 $\frac{3}{4}$	5 $\frac{3}{4}$	2.50
USQQ	12 $\frac{1}{4}$	21	7 $\frac{3}{4}$	3	10 $\frac{3}{4}$	3 $\frac{5}{8}$	6 $\frac{1}{8}$	2.50
KQQ	12 $\frac{1}{2}$	19	7 $\frac{3}{4}$	3	10 $\frac{1}{2}$	4	6	2.50
TM	12 $\frac{3}{4}$	20	6 $\frac{3}{4}$	3	11	3 $\frac{1}{2}$	5 $\frac{1}{4}$	2.50
S	12 $\frac{1}{2}$	20	7 $\frac{3}{4}$	3	10 $\frac{3}{4}$	3 $\frac{5}{8}$	6	2.50
SS	12 $\frac{3}{4}$	21	8 $\frac{1}{4}$	2	10 $\frac{7}{8}$	3 $\frac{1}{2}$	6 $\frac{7}{8}$	2.75
T	13	21	7 $\frac{1}{4}$	3	11 $\frac{1}{2}$	3	5 $\frac{3}{4}$	2.75
B	14	21 $\frac{3}{4}$	7 $\frac{1}{2}$	3	12 $\frac{1}{2}$	3 $\frac{1}{4}$	5 $\frac{3}{4}$	2.75
UUU	14	19	9 $\frac{3}{4}$	3	12 $\frac{1}{4}$	5 $\frac{3}{4}$	7 $\frac{7}{8}$	2.75
UU	14	19	7 $\frac{1}{4}$	3	11 $\frac{7}{8}$	3 $\frac{1}{2}$	5 $\frac{1}{2}$	2.75
U	14	18	7 $\frac{1}{4}$	3	11 $\frac{7}{8}$	3 $\frac{1}{2}$	5 $\frac{1}{2}$	2.75
GU	14	18	6 $\frac{1}{2}$	4	12 $\frac{1}{4}$	4	5	2.75
UA	14	18	8 $\frac{1}{4}$	3	11 $\frac{7}{8}$	3 $\frac{1}{2}$	6 $\frac{1}{2}$	2.75
UM	14	21 $\frac{1}{2}$	7 $\frac{1}{2}$	3	12 $\frac{1}{2}$	3 $\frac{3}{4}$	5 $\frac{3}{4}$	2.75
SI43	14	22	7 $\frac{1}{2}$	3	12 $\frac{1}{2}$	3 $\frac{3}{4}$	5 $\frac{3}{4}$	2.75
V	14 $\frac{1}{2}$	19	8 $\frac{1}{2}$	3	13 $\frac{1}{4}$	5	7	2.75
VVV	14 $\frac{3}{4}$	19 $\frac{1}{4}$	6 $\frac{7}{8}$	3	13	3 $\frac{1}{4}$	5 $\frac{1}{2}$	3.00
VV	14 $\frac{5}{8}$	19	7 $\frac{3}{4}$	3	13 $\frac{1}{2}$	3 $\frac{3}{4}$	5 $\frac{7}{8}$	3.00
TXX	16	24	9 $\frac{1}{4}$	3	14 $\frac{1}{2}$	5	7 $\frac{1}{2}$	3.50
X	16	25	7 $\frac{3}{4}$	3	14 $\frac{5}{8}$	4	6 $\frac{1}{4}$	4.00
XX	16	22	8 $\frac{1}{2}$	3	14 $\frac{1}{2}$	4 $\frac{1}{2}$	6 $\frac{3}{4}$	3.50
YY	17	21	8 $\frac{1}{2}$	3	15 $\frac{1}{4}$	4 $\frac{5}{8}$	6 $\frac{5}{8}$	3.50
AF	17 $\frac{1}{2}$	23	9	3	.....	.....	7 $\frac{1}{2}$	3.50
TTY	20	37	10 $\frac{1}{2}$	3	For Roasting	.....	.....	10.00
Z	30	54	12	3	For Roasting	.....	.....	20.00

SPECIAL MUFFLES FOR THE COLORADO FURNACES

LA	6 $\frac{1}{2}$	7	4 $\frac{1}{2}$	4	5 $\frac{3}{4}$	3 $\frac{1}{4}$	3 $\frac{3}{4}$	.50
LB	6 $\frac{1}{2}$	10	4 $\frac{1}{2}$	4	5 $\frac{3}{4}$	3 $\frac{1}{2}$	3 $\frac{3}{4}$	.75
LC	8 $\frac{1}{2}$	12	5 $\frac{1}{2}$	4	7 $\frac{1}{2}$	3 $\frac{3}{4}$	4 $\frac{5}{8}$	1.15
LD	10 $\frac{3}{4}$	16	6	4	9 $\frac{1}{2}$	3 $\frac{3}{4}$	4 $\frac{7}{8}$	1.75
LE	15	18	7	4	13 $\frac{3}{4}$	4	5 $\frac{1}{2}$	2.75
LX	6	8	3 $\frac{1}{2}$	4	5 $\frac{1}{4}$	2 $\frac{3}{4}$	2 $\frac{3}{4}$	.75

SPECIAL MUFFLES FOR AMERICAN GAS FURNACE CO.'S FURNACES

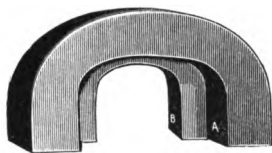
A1	3 $\frac{5}{8}$	5 $\frac{1}{2}$	2 $\frac{1}{2}$	2	.....	.....	.....	.50
A2	3 $\frac{3}{4}$	7 $\frac{1}{4}$	2 $\frac{1}{2}$	2	.....	.....	.....	.50
A3	6 $\frac{1}{2}$	10	4 $\frac{1}{2}$	2	.....	.....	.....	.75
A4	7 $\frac{1}{2}$	13	4 $\frac{5}{8}$	2	.....	.....	.....	1.20
A5	11 $\frac{1}{2}$	19 $\frac{3}{4}$	7 $\frac{1}{2}$	3	10	3 $\frac{1}{2}$	6	2.40
A6	13 $\frac{1}{2}$	15 $\frac{1}{4}$	6 $\frac{3}{4}$	3	11 $\frac{3}{4}$	3 $\frac{1}{2}$	5 $\frac{1}{2}$	2.50
A7	21	20	7 $\frac{5}{8}$	3	19	3 $\frac{3}{4}$	5 $\frac{3}{8}$	4.00

2843 QA Shelf Muffles. Outside Dimensions 12 x 19 x 7 $\frac{3}{4}$. One shelf, \$3.00,
Other sizes made to order.

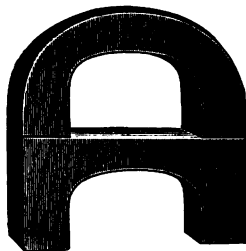
Shelves for QA Muffle (2 pieces to set)per set \$0. 25

MUFFLE ARCHES AND DOORS

ARCHES



Nos. 2844-2846



No. 2848

2844 **Muffle Arch A.** 9 inches thick.

Size of muffles	LL	I	II	NN	QQ	T	U
Price.....	\$1.10	1.25	1.25	1.25	1.30	1.40	1.50

Any other size made to order at proportionate price.

2846 **Muffle Arch Reducer B.**

Size for muffles	LL	I	II	NN	Q	QQ	SS	U	UUU	V
Price.....	\$0.40	.45	.50	.60	.70	.75	.85	.95	1.00	1.10

To diminish the opening admitting a 20 gramme crucible and to prevent cold air draft from striking the muffle when in use.

2848 **Muffle Arches.** For two-muffle assay furnace, 9 inches thick.

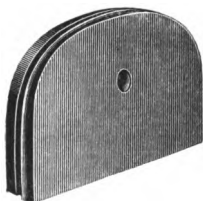
Set of two, for muffles ...	LL	I	II	NN	QQ	T	U
Price..... per set	\$2.20	2.40	2.50	2.50	2.60	2.80	3.00

2850 **Muffle Arch Front.** For Colorado three-muffle tile-lined furnace, taking NN or QQ muffles..... \$3.00

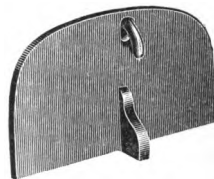
2852 **Muffle Arch Front.** For Colorado two-muffle tile-lined furnaces, size for LL-NN-QQ-UU muffles, round and flat top per pair 2.50

2854 **Muffle Coolers.** Of fire clay to be used in front of cupels, size, $1\frac{1}{8} \times 1\frac{1}{8} \times 6$ 12

DOORS



No. 2856



No. 2858

2856 **Muffle Doors, Clay.** With binding wire.

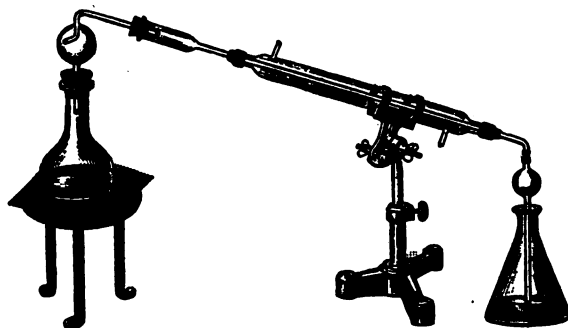
Size for muffles	LX	LA	LB	LC	LD	LE
Price.....	\$0.20	.20	.20	.25	.25	.30
Size for muffles.....	GC	GE	GF	GK	GI	GU
Price.....	\$0.25	.25	.25	.30	.30	.35
Size for muffles.....	LL	NN	Q	QQ	U	UUU
Price.....	\$0.25	.25	.25	.25	.30	.35

2858 **Muffle Doors, Iron.**

Size for muffles.....	LL	NN	QQ	U	Reducers
Price.....	\$0.50	.60	.75	1.00	.50

2860 **Muffle Doors, Sheet Iron.** Asbestos lined, made to order for any muffle.

NITROGEN APPARATUS

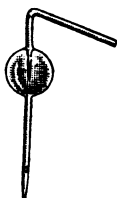


No. 2862

- 2862 Nitrogen Distilling Apparatus. Kjeldahl's, for nitrogen determination modified by Reitmaier and Stutzer, complete..... \$7.00



No. 2864

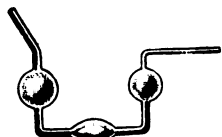


No. 2866



No. 2868

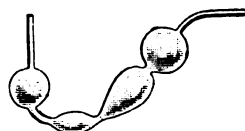
- | | | |
|------|---|--|
| 2864 | Nitrogen Distilling Apparatus. Connecting bulbs, Kjeldahl's..... | .50 |
| 2866 | Nitrogen Connecting Bulbs. Kjeldahl's, modified by Hopkins, (see Journal Am. Chem. Soc., No. 3, 96)..... | .75 |
| 2868 | Nitrogen Connecting Bulb. Kjeldahl's, modified by C. A. Jennings, having a tubule in the bulb, and designed especially for water analysis, allows of the introduction of water or permanganate solution without removing the stopper, eliminating the danger of the introduction of ammonia into the flask, each..... | .75 |
| 2870 | Nitrogen and Digesting Flasks. Kjeldahl's, pear shape, round bottom, extra long neck, of Jena glass. | |
| | Capacity.....cc. | 200 300 500 800 1000 |
| | Each..... | \$0.30 .36 .50 .60 .75 |



No. 2872



No. 2874



No. 2876

- | | | |
|------|--|--------|
| 2872 | Nitrogen Bulbs. French pattern..... | \$0.40 |
| 2874 | Nitrogen Bulbs. Varrentrapp and Wills..... | .35 |
| 2876 | Nitrogen Bulbs. Same as above, but with 4 bulbs..... | .40 |

NITROGEN APPARATUS

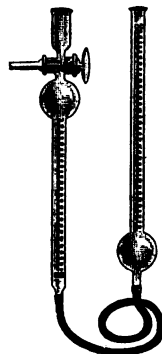
NITROMETERS



No. 2878

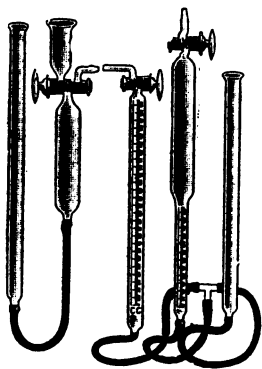


No. 2880

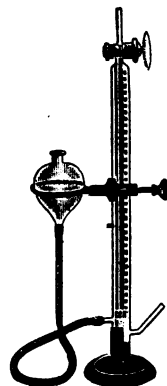


No. 2884

- 2878 Nitrometers, Horn's. For determination of N in gun powder, etc., with leveling bulb and connections..... \$7.00
- 2880 Nitrometers, Lunge's. For saltpeter, nitroglycerine, etc., graduated to 50 cc. in 1-10 s., with connections..... 5.00
- 2882 Nitrometers, Lunge's. As above, graduated to 100 cc., with connections.... 6.00
- 2884 Nitrometers, Lunge's. For saltpeter, nitroglycerine, etc., graduated from 100 to 140 cc. in 1-10s..... 6.00



No. 2886



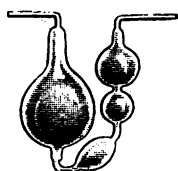
No. 2888

- 2886 Nitrometers, Lunge's. For nitrore, nitrocellulose, dynamite, etc., gas measuring tube, graduated to 100 cc. in 1-5, with reduction and generating tube and two leveling tubes. Complete..... \$12.50
- 2888 Nitrometers, Schiff's. Graduated to 100 cc., on support with reservoir and clamp and connections..... 6.00

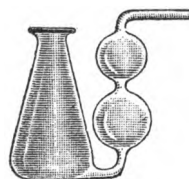
NITROGEN APPARATUS



No. 2890

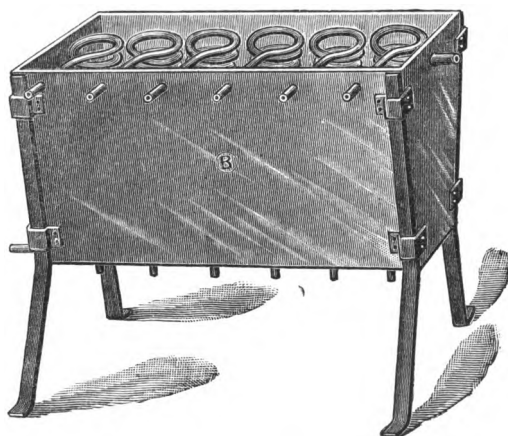


No. 2892



No. 2894

2890	Nitrogen Bulbs, Volhard's. Right angle bulb	\$0.50
2892	Nitrogen Bulbs, Troilius'. With 4 bulbs .....	.50
2894	Nitrogen Bulbs, Fresenius'. For direct titration .....	.50

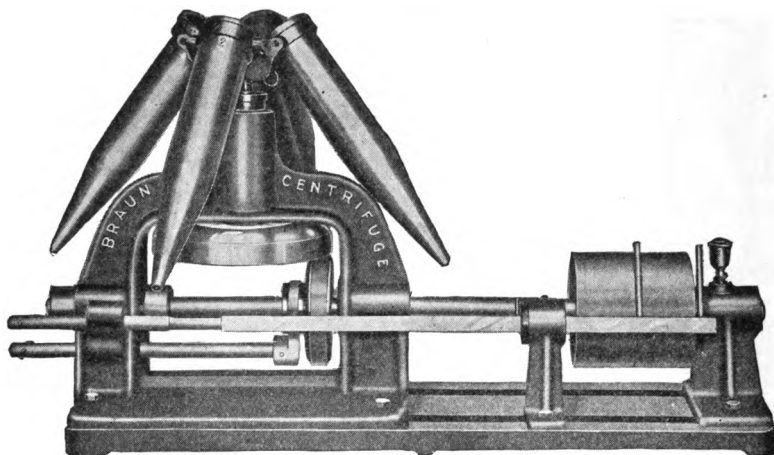


No. 2896

NITROGEN DETERMINATION

2896	Kjeldahl's Condensers. Of copper, tin-lined, with six coils of pure block tin, each	\$25.00
2898	Kjeldahl's Digesting Shelf. Square with six burners and stopcock, each.....	18.00
	Oil Sample Bottles. See Bottles, page 94, No. 954.	
	Oil Calorimeters. See Calorimeters, page 115.	

CENTRIFUGAL OIL TESTING APPARATUS



No. 2900

Braun's Oil Centrifuge—For the determination of sediment and water in crude oils. In the determination of sediment and water in crude oils, the experience of chemists throughout the country has demonstrated beyond a doubt, first, that a centrifugal machine is an absolute necessity, and second, that the small hand, water or electrically driven centrifuge, suitable for physicians' use, is entirely inadequate and useless when a thick, viscous substance is to be dealt with.

After a long series of experiments, in which we have made and discarded many types of centrifuges, we have at last a machine to offer, which will meet with the approval of the most exacting.

SPECIAL FEATURES

Roller bearings, reducing friction to a minimum, and necessitating oiling only about once in six months.

Adjustable friction clutch, permitting a variation of speed between the limits of 1000 and 2000 revolutions per minute, while motor or shaft runs at a constant velocity.

Arrangement for maintaining speed constantly at any desired velocity.

Massive construction, first-class material and perfect balancing permit machine to be run at high speed without vibration or danger.

Four tubes on heavy cross arms enable four determinations to be made at one time.

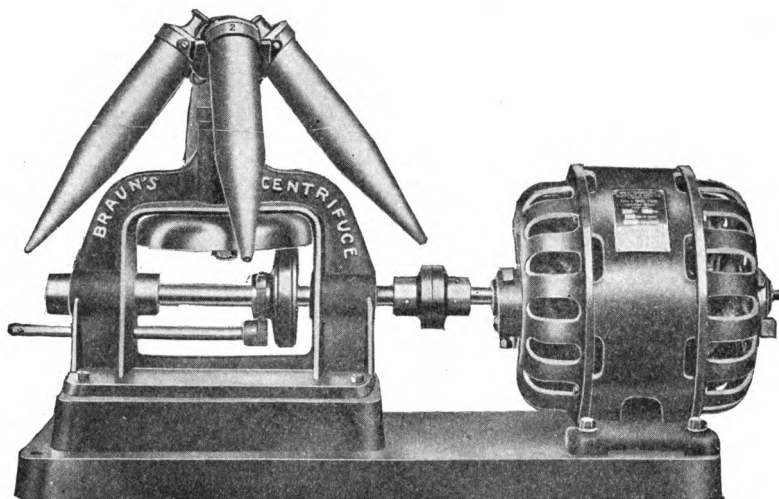
Tubes of a special shape, graduated in 1-10 cc. for the first cubic centimeter, and in 2-10 cc. for the next two cubic centimeters permit a rapid and accurate reading of results.

Glass tubes are arranged to be surrounded by water in aluminum shields; this acts as a cushion and reduces the danger of breaking to a minimum.

Special arrangement for transmitting the power permits of gradually increasing the speed from rest to the desired speed, thereby eliminating all slopping of oil out of the tubes.

The arrangement of power transmission permits the motor or shaft to be mounted with axis in horizontal position.

CENTRIFUGAL OIL TESTING APPARATUS



No. 2902
WITH MOTOR

With this machine a complete separation of oil, water, sand and B. S. in any sample can be effected in about fifteen minutes. Experience has shown that a tube of less capacity than 100 cc. is not satisfactory.

The machine is made in one size only, but can be furnished mounted on base, directly connected to any standard motor for either alternating or direct current; or, if preferred, can be furnished with tight and loose pulleys, to be operated by belt from countershaft.

2900 Braun Centrifuge, Belt Driven. Equipped with tight and loose pulleys.
 $\frac{1}{4}$ H. P. necessary to operate.

Length of base.....	25 $\frac{1}{2}$ in.	Diameter of pulleys.....	4 in.
Width of base.....	11 $\frac{1}{2}$ in.	Width of pulleys.....	2 in.
Height.....	17 in.	Net weight.....	90 lbs.
R. P. M. required.....	900	Shipping weight.....	120 lbs.
Price, complete.....			\$105.00

2902 Braun Centrifuge, Electrically Driven. Without motor.

$\frac{1}{4}$ H. P. necessary to operate.

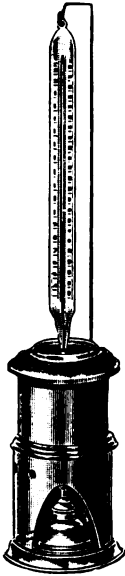
Length of base.....	25 $\frac{1}{2}$ in.	R. P. M. required.....	900
Width of base.....	11 $\frac{1}{2}$ in.	Net weight.....	80 lbs.
Height.....	17 in.	Shipping weight.....	110 lbs.
Price, Centrifuge only.....			\$100.00

Electric Motors for Above.

$\frac{1}{4}$ H. P. motor, single-phase, 1720 R. P. M.....	\$50.00
$\frac{1}{4}$ H. P. motor, 110 D. C.....	35.00
$\frac{1}{4}$ H. P. motor, 220 D. C.....	41.00
$\frac{1}{2}$ H. P. motor, polyphase.....	37.75

All machines are properly adjusted and thoroughly tested in factory before shipping.

OIL TESTERS



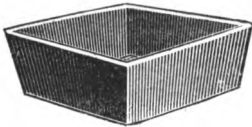
No. 2904



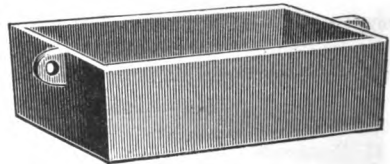
No. 2906

- 2904 Oil Tester. For open fire test, to ascertain at what temperature the coal oil will flash or explode. Complete with standard thermometer, each \$7.50
- 2906 Oil Tester, Elliott's. Standard of New York State, Iowa, New Jersey, Michigan, and in general use everywhere, with correct thermometer; arranged for oil lamp or Bunsen Burner, each 10.00
- Ore Sample Bags — See following page.

PANS—PAPER



No. 2908



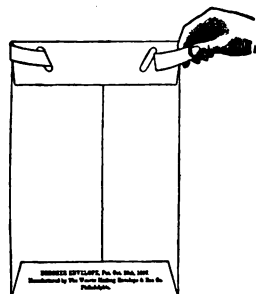
No. 2910

- 2908 Pans. Of cast iron, for drying and roasting ores. Size, 6x6x2¼ inches deep, each \$0.50
- 2910 Pans. Of cast iron, with 2 handles, for drying slimes of precipitates, size, 18x12x6 inches, each 5.00
- Pans, Sampling. See Sampling Pans, page 355, Nos. 3194-3196.
- Paper, Litmus and Turmeric. See Test Paper.
- 2912 Paper, Black Glazed. For sampling, etc. In sheets, 10x12 inches. Per 100 sheets.....\$0.60. Per 1,000 sheets 5.00
- 2914 Paper, Manila. Medium, for mixing assay samples, best quality, in sheets, 8½x12 inches. Per 100 sheets..\$0.20. Per 1,000 sheets ... 1.75

PAPER, ETC.

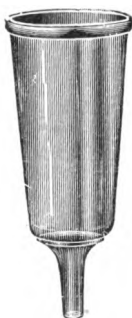


No. 2918



No. 2920

2916	Paper Bags. Manila, for ore samples, size $4\frac{1}{2} \times 7$ inches. Per 1000.....	\$3.50
2918	Paper Blocks. C. S. & S., for absorbing difficult combustible liquids in calorimetric determinations. Per 100.....	1.10
2920	Paper Mailing Envelopes. For ore samples.	
	Capacity .....oz. 1 2 4 6 8	
	Size.....in. 3×5 $3\frac{1}{2} \times 6$ 4×7 $4\frac{1}{2} \times 8$ 5×9	
	Per 100.....	\$0.60 .80 1.00 1.20 1.50
2922	Paper Ore Bag. Excelsior, for mailing; $3\frac{1}{2} \times 5$ inches when closed. Is folded and gummed in such a way that when sealed it is absolutely tight. Especially adapted for mailing finely ground ore samples or powdered substances. Per 1000.....	3.50



No. 2924



No. 2926

2924	Percolators. Conical form, flint glass.					
	Capacity.....	pt.	qt.	$\frac{1}{2}$ gal.	1 gal.	2 gal. 3 gal.
	Each.....	\$0.30	.40	.60	.80	1.80 3.00
2926	Percolators, Oldberg's. Narrow form, flint glass.					
	Capacity.....	$\frac{1}{2}$ pt. pt.	qt.	$\frac{1}{2}$ gal.	1 gal.	2 gal. 3 gal.
	Each.....	\$0.30	.35	.45	.70	1.10 2.00 3.00
	Picks. Prospecting. See Hammers, page 264, No. 2412.					
	Pinchcocks, Mohrs. See Clamps, page 123, No. 1362.					
2928	Pipe. Pure block tin, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$ inch inside diam.....					market price
2930	Pipe. Lead, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$ inch inside diam.....					market price

PIPETTES.



No. 2932

2932	Pipettes. Small, with rubber bulb, straight end.....	each	\$0.05
	Dozen.....		.30
2934	Pipettes. Small, with rubber bulb, bent end.....	each	.05
	Dozen.....		.30

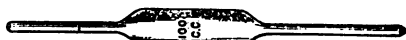


No. 2934



No. 2936

2936	Pipettes. With bulb, not fixed.												
	Capacity.....cc.	5	10			25	50	100	200				
	Each.....	\$0.10	.12			.15	.20	.25	.40				
2938	Pipettes, Volumetric. Most carefully graduated.												
	Capacity.....cc.	1	2	3	5	10	15	20	25	50	75	100	200
	Each.....	\$0.10	.12	.15	.18	.20	.25	.25	.30	.40	.45	.50	.70
2940	Pipettes, Volumetric. Standardized by the National Bureau of Standards, Washington, D. C., with control stamp.												
	Capacity.....cc.	1	5			10	25	50	100				
	Each.....	\$1.25	1.35			1.40	1.50	1.60	1.85				



No. 2938



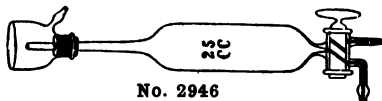
No. 2942

2942	Pipettes, Mohr's. Most accurately graduated in cubic centimeters and fractions.												
	Capacity....cc.	1	1	2	5	10	10	20	25	50	100		
	Graduated....	1-10	1-100	1-50	1-20	1-10	1-20	1-10	1-10	1-10	1-5		
	Each.....	\$0.25	.35	.40	.45	.50	.55	.60	.70	1.00	1.50		



No. 2944

2944	Pipettes, Mohr's. With glass stopcock and graduated.												
	Capacity.....cc.	10	25	50	100								
	Graduated.....	1-10	1-10	1-10	1-5								
	Each.....	\$1.25	1.50	2.00	2.50								



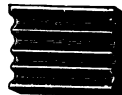
No. 2946

2946	Pipettes, Overflow. Fresenius'. With 3-way stopcock.												
	Capacity.....cc.	10	25	50	100								
	Each.....	\$2.25	2.50	2.75	3.00								



No. 2950

2948	Pipettes, Assay Ton. 29.166 cc.....	each	\$0.60
2950	Pipettes, Sucrose. 52.096 cc.....	each	1.50
2952	Pipette Rests. Of porcelain, fluted.....	each	.65



No. 2952

NOTES UPON THE USE AND CARE OF PLATINUM WARE

It is important to remember that, although platinum is not oxidized in the air at any temperature, nor attacked by any single acid, yet there are many substances that attack and combine with it at comparatively low temperatures.

The caustic alkalis, the alkaline earths, nitrates and cyanides, and especially the hydrates of barium and lithium, attack platinum at a red heat, although the alkaline carbonates have no effect at the highest temperatures. Sulphur in the absence of alkalis, has no action, but phosphorus and arsenic attack platinum when heated with it.

Direct contact of platinum with burning charcoal should be avoided, since the silicon reduced from the charcoal ash unites platinum, making it brittle and liable to fracture.

Also contact with compounds of the easily reducible metals is especially dangerous at high temperatures, as alloys with platinum having a low fusing point are readily formed. This is especially true of lead.

Heating of platinum with spirit lamps is preferable to the use of ordinary gas. When gas is used, care should be taken to have the supply of air sufficient to insure complete combustion, since, with the flame containing free carbon, the platinum suffers deterioration by the formation of a carbide of platinum, which, oxidizing later, blisters the metal. For this reason, also, the inner cone or reducing flame should not be in contact with the metal.

The loosening effect of the Bunsen flame upon the surface of platinum exposed to its action produces the familiar gray appearance which can not be removed except by burnishing. Platinum triangles often become gray and very brittle from the same cause. Systematic application of moist sand to all articles affected in this way, after use, will keep them in prime condition and materially prolong their life, with but a trifling loss in weight.

CLEANING PLATINUM WARE

Every careful analyst of necessity uses clean utensils. A habit of cleaning and polishing platinum dishes immediately after using is easily formed, and repays the user with increased confidence in his work as well as in the prolonged life of the article.

Rubbing the surface of platinum with moist sea sand (round grains only), applied with the fingers, serves to remove most impurities and to polish the metal without material loss.

Fusing bisulphate of potash or borax in the dish and then boiling in water and polishing as above with sand is recommended by Gmelin. When it is desired to clean the outer surface of dishes in this manner, they must be placed in dishes of sufficient size to allow the fused flux to completely envelope the article to be cleaned.

Sodium amalgam possesses the property of wetting platinum without amalgamating with it, even when other metals are purposely added to the amalgam. This substance is, therefore, useful for effecting a quick and thorough cleansing of platinum. The amalgam is gently rubbed upon the metal with a cloth and then moistened with water, which oxidizes the sodium and leaves the mercury free to alloy with foreign metals. The mercury is then wiped off and the dish cleaned and polished with sand, as above described.

If the existence of a base metal alloyed with the platinum is suspected, immerse the article in question first in boiling HCl for a few minutes, then, after thorough rinsing with clean water, immerse in boiling HNO_3 acid free from chlorine.

If the dish is unaffected in weight or appearance, and the acid baths fail to give reaction for the base metals, their absence in appreciable quantities is assured.

We handle only the Platinum Ware of the best manufacturers.

The purity is guaranteed and the shapes are of the latest designs.

The Crucibles and Dishes are hammered. Special apparatus is made to order.

Weights given are approximate only.

List prices are not given on account of the fluctuation in the market, but our quotations are in accord with the lowest market prices.

Quotations are for immediate acceptance only.

Old or scrap Platinum bought or taken in exchange.

PLATINUM COMBUSTION BOATS



No. 2954

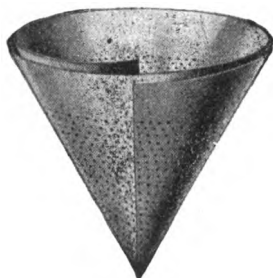
		Approximate Weight, Grammes	
2954	$\frac{1}{2}$ -inch wide x $\frac{3}{8}$ -inch deep.....	$1\frac{1}{2}$ inches long.....	2.8
		2 inches long.....	3.6
		3 inches long.....	5.8
		$3\frac{3}{4}$ inches long.....	6.3

Other sizes and shapes made to order. Sold by the piece.

GOOCH FORM CRUCIBLE



SEAMLESS PLATINUM FILTER CONE



No. 2956



No. 2958

SEAMLESS PLATINUM FILTER CONES

2956 Seamless Filter Cones. 60°, coarse or fine perforations. Sold by the piece.

Stock sizes as follows, other sizes to order.

Diameter.....inches	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2
Approx. weight.....grammes	1	1.5	2.1	3.1	5.3	7.5	9.2

PLATINUM CRUCIBLES, GOOCH FORM, WITH OR WITHOUT COVERS

2958 Platinum Crucibles, Gooch Form. With covers and caps, weigh as follows:

Capacity	cc.	10	15	20	25	30
Approx. weight.....	grammes	13	18	22	29	34
Diameter and depth	cm.	2.7	3.2	3.3	3.6	3.9

Coarse or fine perforation. Covers are always furnished with crucibles unless otherwise ordered. Gooch Crucibles of other capacities, made to order.

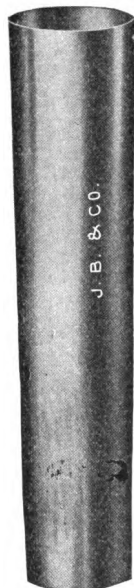
In ordering new crucible covers, please to specify the inner diameter of top of your crucibles. This is important, since crucibles of the same capacity of different makes frequently vary considerably in pattern.

PLATINUM

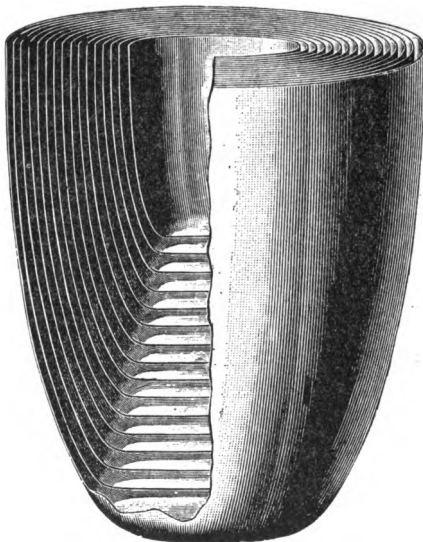
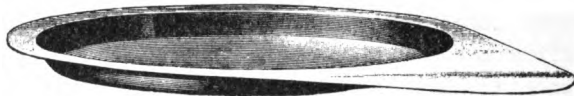
CRUCIBLES

WITH OR WITHOUT COVERS
HAMMERED AND GUARANTEED
(Full Size from 10cc. to 90cc., Inc.)

ACCORDING TO
J. LAWRENCE SMITH
FOR ALKALI
DETERMINATION



No. 2960



No. 2962

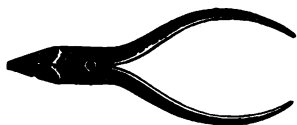
2960 Platinum Crucibles. According to J. Lawrence Smith. For alkali determination. 8.0 cm. high. 1.8 cm. top diameter. Weight, 35 grammes, including cover.

2962 Platinum Crucibles. With or without covers. Hammered and guaranteed. Platinum crucibles with covers weigh approximately as many grammes as they hold cubic centimeters, as follows:

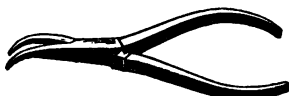
Capacity.....cc.	8	10	15	20	25	30	40
Approx. weight.....grammes	8	10	15	20	25	30	40
Diam. and depth.....cm.	2.2	2.5	3.0	3.3	3.5	4.0	4.2
Capacity.....cc.	50	60	70	80	90	100	110
Approx. weight.....grammes	50	62	65	68	70	80	90
Diam. and depth.....cm.	4.4	4.7	5.0	5.3	5.4	5.6	5.7

Covers are always furnished with crucibles, unless otherwise ordered. Crucibles of other weights and capacities made to order. Gold, silver and gold-lined platinum crucibles made to order.

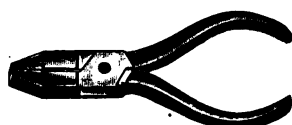
PLIERS, NIPPERS AND POTASH BULBS



No. 2998

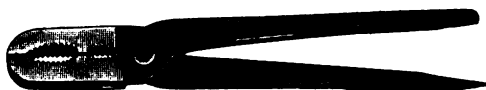


No. 3000



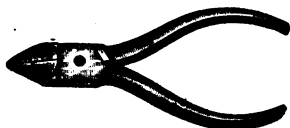
No. 3004

2998	Pliers, "Button." Straight nose for holding buttons while brushing, size, 5 inches	\$0.40
3000	Pliers, "Button." Curved nose, 5-inch .....	.40
3002	Pliers, "Button." Curved nose, 5-inch, fine point	1.00
3004	Pliers, Flat Nose. Steel faced, 6-inch, side cutting .....	.40

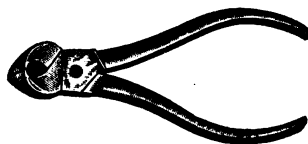


No. 3006

3006	Pliers, Gas. Length, 8 inches .....	.50
3007	Pokers, Iron. For furnaces .....	.50

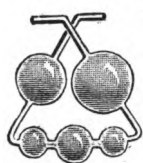


No. 3008

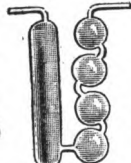


No. 3010

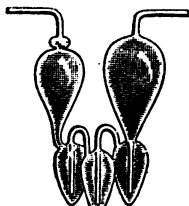
3008	Nippers, Side Cutting		
	Length.....inches	5	6
	Each	\$0.75	.85
3010	Nippers, End Cutting		
	Length.....inches	5	6
	Each.....	\$0.75	.85



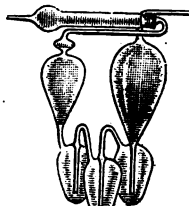
No. 3012



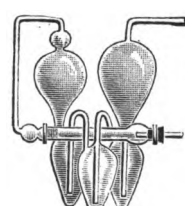
No. 3014



No. 3016



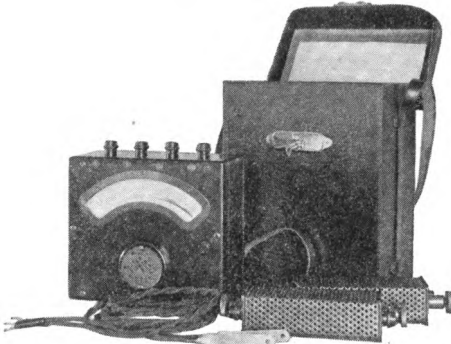
No. 3018



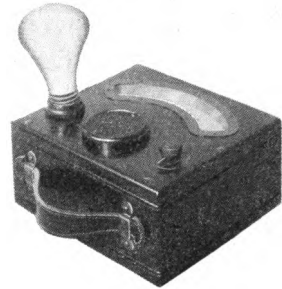
No. 3020

3012	Potash Bulbs, Liebigs. With 5 bulbs	\$0.50
3014	Potash Bulbs, Mitscherlich's .....	.50
3016	Potash Bulbs, Geissler's. Plain.....	.85
3018	Potash Bulbs, Geissler's. With Ca Cl ₂ tube, cork joints.....	1.00
3020	Potash Bulbs, Geissler's. With Ca Cl ₂ tube, ground glass joints.....	1.50

WAGNER PORTABLE INSTRUMENTS



No. 3022



No. 3024

3022 Portable Type of Milli-Volt and Milli-Ammeters. Wagner portable instruments are designed and built with the same care and attention to detail that has given Wagner switchboard instruments their high reputation for reliability and precision.

M. P. M. milli-voltmeter, any scale, from 0-20 minimum to 0-1000 maximum\$90.00
M. P. M. milli-ammeter, any scale, from 0-20 minimum to 0-1000 maximum..... 95.00

Portable Voltmeters, for Direct Current only

Scale..	0-60	0-75	0-125	0-150	0-250	0-300	0-600	0-750
Each..	\$100.00	104.00	110.00	112.00	120.00	122.00	125.00	130.00

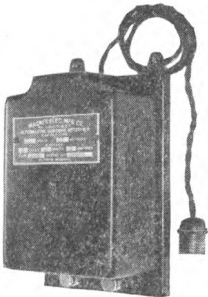
Portable Voltmeters, for Direct or Alternating Current

Scale..	0-60	0-75	0-125	0-150	0-250	0-300	0-600	0-750
Each..	\$116.00	120.00	123.00	126.00	132.00	135.00	136.00	140.00

3024 Portable Lamp Testing Volt-Wattmeters.

These instruments perform the functions of eight instruments, and can be used on A. C. or D. C. for testing lamps, small motors, etc.

Upper scale in volts.....	0-150 } 0-300 }	0-150
Lower scale in watts.....	0-150 } 0-300 }	0-150
Each.....	\$160.00	140.00



No. 3026

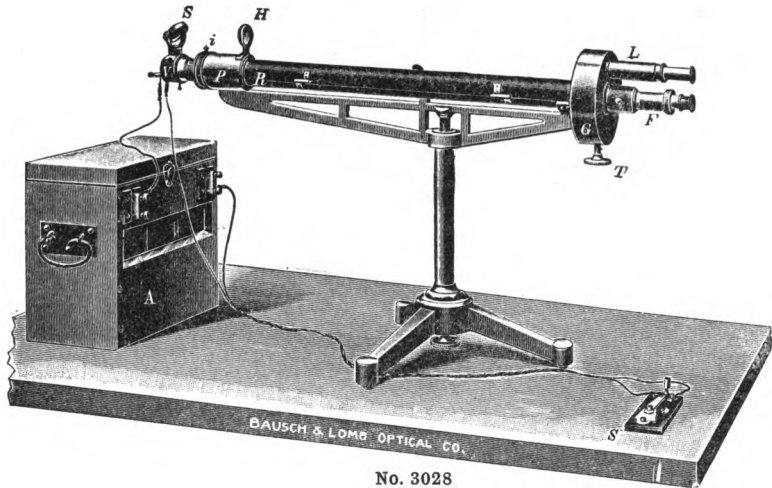
3026 Wagner A. C. Rectifiers. For charging ignition and lighting storage batteries used in automobiles, motor boats, gas engines, etc. Converts alternating to direct current. No sloppy chemicals, cannot be connected wrongly. Lowest priced rectifier on the market. Simple, compact and portable.

No knowledge of electricity necessary in order to use it. Merely connect plug to lamp socket of any 60 cycle alternating current supply, and the charging operation is automatic.

Style	Without ammeter	With ammeter
Price, 3 ampere.....each	\$35.00	\$45.00
Price, 5 ampere.....each	35.00	45.00

Also: Single and polyphase motors, A. C. generators, transformers, instruments, rectifiers and single-phase rotary converters.

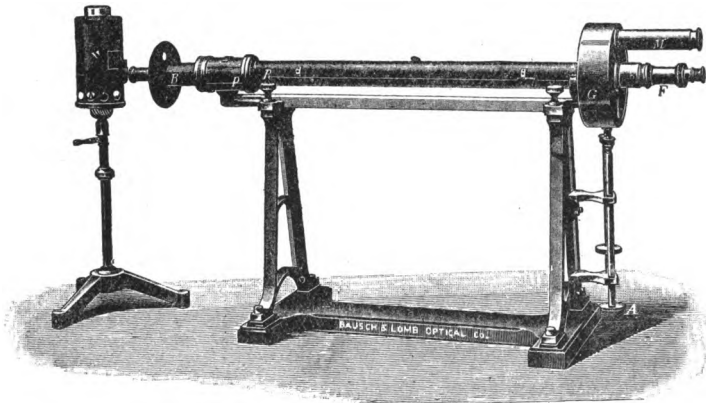
POLARISCOPES



SCHMIDT HAENSCH POLARISCOPES

These polariscopes are constructed similarly to that above, differing only in the compensating wedge, which is single in these instruments.

3028 With single wedge compensation and triple field of vision, complete, with one each 100-mm. and 200-mm. tubes, mounted on trestle support and including folding glass case, but no source of illumination . . \$263.00



No. 3030

Not Requiring Monochromatic Light

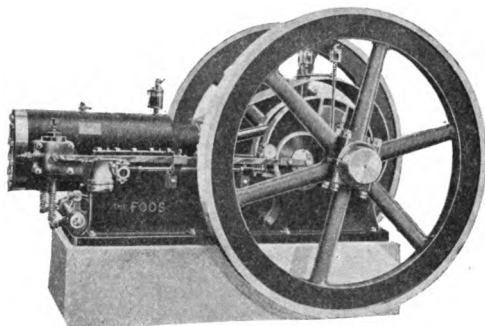
This is the latest improved type of polariscop or saccharimeter for the sugar laboratory. Readings give the per cent of sugar direct.

3030 Half shade with double wedged compensation and triple field of vision, complete, including one 100-mm. and one 200-mm. tube without lamp, mounted on trestle support, including folding glass case . . . \$347.00

POWER EQUIPMENT

We carry a complete line of shafting, hangers, pulleys, belting, etc., and are prepared to supply complete arrangements for driving crushers and pulverizers by power, including the bench on which to mount the machines. Complete information needed for quoting.

We can furnish anything in the way of power that you require, either vertical or horizontal steam engines, direct current or Wagner single or poly-phase alternating current motors, transformers transmission lines and electrical supplies of any description.



Nos. 3032-3034

THE FOOS GASOLINE ENGINE

This engine is a single cylinder type, 4-cycle, made in sizes from 3 to 90 horse power. They are furnished to operate with all liquid fuels, including kerosene, naphtha, distillate, alcohol, natural, artificial and power gas. Write us for special catalogue which is devoted to detailed description of the many features of design and construction developed in 24 years of exclusive gas engine building.

3032	2 horse power.....	\$150.00
3034	3 horse power.....	200.00

We carry in stock the Foos Engine in two sizes, regular Foos in sizes from 3 horse power up, and the Foos Junior, 2 to 8 horse power, both types furnished in a large variety of equipment.

Any further information in reference to the above power equipment will be gladly supplied.

For electric motors, see pages 312-314.

Primary Batteries. See page 71.

Pulverizers. See Crushers, pages 150-165.

Pumps, Hand, for Air. See page 87, No. 880.

PYROMETERS

BASE METAL PYROMETER



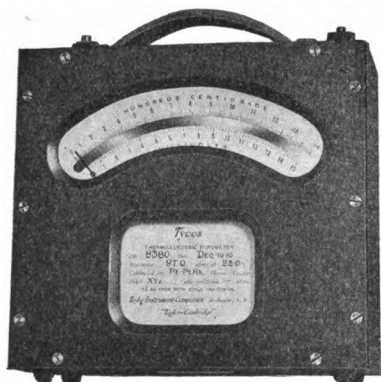
Nos. 3036-3042

WALL TYPE INDICATING OUTFIT

	Scale °F	Use	Thermo-Couple Length, In.	Diameter In.	Price
3036	200 to 1000	Flues, metal baths, varnish or oil baths, etc.....	39	$\frac{3}{4}$	\$75.00
3038	200 to 1000	Superheated steam, etc.....	13	$\frac{1}{2}$	75.00
3040	300 to 2200	Furnaces, flues, metal baths, etc.....	39	$\frac{3}{4}$	75.00
3042	300 to 1800	Superheated steam.....	13	$\frac{1}{2}$	75.00

*Standard pipe thread.

PORTABLE INDICATOR FOR PYROMETERS



Nos. 3044-3050

Portable indicator complete in hardwood case, with carrying handle, and black and white, insulated binding posts.

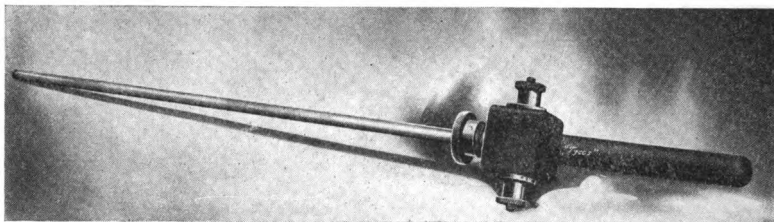
Calibrated for use with Taylor Standard Thermo-Couples, to read directly in temperature, calibrated also in millivolts.

	Range	Price
3044	0 to 2500° Fahrenheit.....	\$105.00
3046	0 to 3000° Fahrenheit.....	105.00
3048	0 to 1400° Centigrade.....	105.00
3050	0 to 1600° Centigrade.....	105.00

Also calibrated for use with Taylor Standard Base Metal Couples. Price includes 15 feet flexible cable, with tangs.

PYROMETERS

RARE METAL THERMO-COUPLES



No. 3052

FOR RECALESCENCE AND LABORATORY TESTS

This thermo-couple is especially convenient for recalescence and other laboratory work or where the material under test is small. As the elements are protected by a small porcelain stem, there is practically no lag in following rapid changes of temperature. The cold junction is protected by a hardwood head insulating it from changes of surrounding temperatures and a socket is provided for the introduction of a thermometer at this point when extreme accuracy is desired.

Specifications

Head.—Hardwood, brass binding posts, screwed plug and split clamp for renewable tip.

Tip.—Porcelain or quartz, outside diameter $\frac{3}{8}$ inch.

Wires.—Platinum and platinum-rhodium throughout.

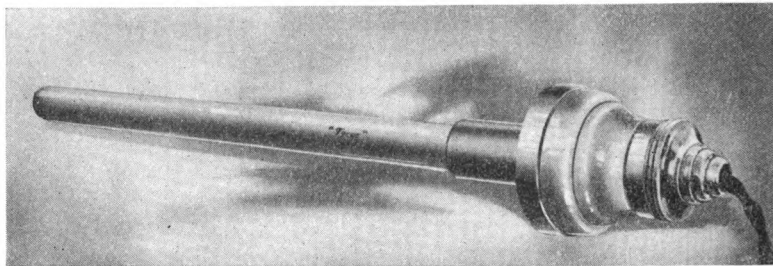
Maximum Temperature.—Quartz tip* 2500° F. Porcelain tip 3000° F. (in oxidizing atmospheres, otherwise 2500° F).

* If quartz tip is desired prefix letter Q, otherwise porcelain tip will be supplied.

3052 Length over all, 13 inches; exposed tip, 10 inches..... each \$42.00

Welded steel sheath, inside diameter, $\frac{5}{8}$ inch for use on lead or salts baths 1.50

FOR PORTABLE USE OR FIXED INSTALLATION



Nos. 3054-3064

Specifications

Head.—Attachment plug and socket, (non-reversible) with aluminum flange.

Stem.—Steel, porcelain or quartz.

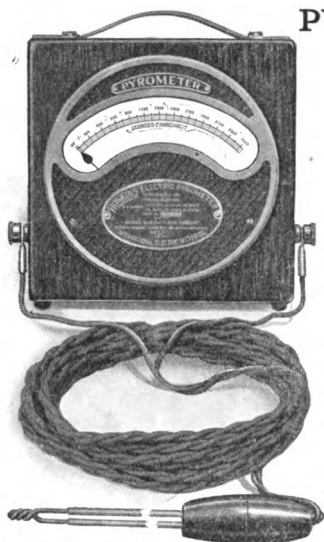
Wires.—Platinum and platinum-rhodium throughout.

Maximum Temperature. Steel, 1500° F. Quartz stem, 2500° F. Porcelain stem, 3000° F. (in oxidizing atmospheres, otherwise 2500° F.)

No.	Length, Inches Under Flange	Porcelain Each	Steel Each	No.	Length, Inches Under Flange	Porcelain Each	Steel Each
3054	13	\$36.00	\$30.00	3060	39	\$75.00	\$60.00
3056	18	45.00	39.00	3062	45	90.00	75.00
3058	27	60.00	51.00	3064	60	105.00	90.00

Complete catalogue sent on request covering all instruments in the Thermo-electric line.

PYROMETERS



Nos. 3066-3068

STANDARD PORTABLE DESIGN

STANDARD PORTABLE DESIGNS

These instruments usable up to 1400° C. (2552°F.) They eliminate wasteful guessing at temperatures, by supplying exact indications of this vital factor in any industrial or experimental operation; particularly in steel hardening and treating furnaces, in combustion, including steam boiler furnaces, blast furnaces, flue gases, pottery kilns, enameling furnaces, laboratories, galvanizing plants and gas producers.

3066	With standard couple	\$50.00
3068	With recalcrescent couple	50.00

ILLUMINATED DIAL METERS

3070	Type PC, wall type, equipped with either standard or recalcrescent couple and leads	100.00
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SELECTIVE SWITCHES

3072	Type P No. 1, three-point	4.00
3074	Type P No. 2, eight-point	7.00
3076	Type P No. 3, sixteen-point	12.00

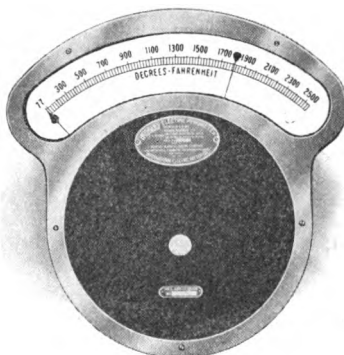
RECALESCENT OUTFITS

Makes possible unbroken success in heat-treating all carbon steels, by telling exactly the right temperature point at which to work any particular one.

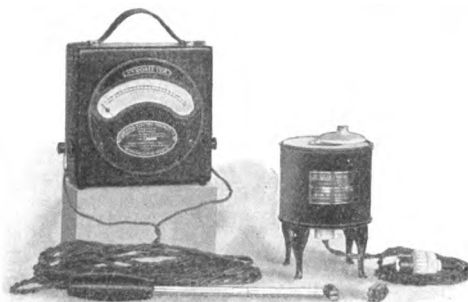
A sample of the steel is clamped to the couple and placed in the heated furnace. The temperature of the piece rises steadily and at the critical point stops momentarily. Easily read, this method is both simple and positive.

3078	Complete, consisting of one pyrometer and one Type FA No. 101 electric furnace	\$75.00
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ILLUMINATED DIAL METER

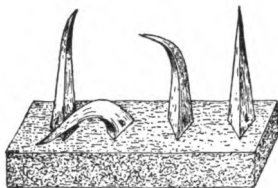


No. 3070



No. 3078

SEGER PYROMETER CONES



No. 3080

3080 Pyrometer cones, Seger, for use in ceramic industry ranging from 590° to 1910° Centigrade. In the following table are shown temperatures at which cones begin to melt.

Cone No.	Temperature Centigrade	Cone No.	Temperature Centigrade
022.....	590°	10.....	1330°
021.....	620°	11.....	1350°
020.....	650°	12.....	1370°
019.....	680°	13.....	1390°
018.....	710°	14.....	1410°
017.....	740°	15.....	1430°
016.....	770°	16.....	1450°
015.....	800°	17.....	1470°
014.....	830°	18.....	1490°
013.....	860°	19.....	1510°
012.....	890°	20.....	1530°
011.....	920°	21.....	1550°
010.....	950°	22.....	1570°
09.....	970°	23.....	1590°
08.....	990°	24.....	1610°
07.....	1010°	25.....	1630°
06.....	1030°	26.....	1650°
05.....	1050°	27.....	1670°
04.....	1070°	28.....	1690°
03.....	1090°	29.....	1710°
02.....	1110°	30.....	1730°
01.....	1130°	31.....	1750°
1.....	1150°	32.....	1770°
2.....	1170°	33.....	1790°
3.....	1190°	34.....	1810°
4.....	1210°	35.....	1830°
5.....	1230°	36.....	1850°
6.....	1250°	37.....	1870°
7.....	1270°	38.....	1890°
8.....	1290°	39.....	1910°
9.....	1310°		

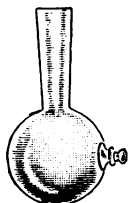
These cones are sold in single numbers packed in boxes of 100 cones each, and also in assorted numbers, any quantity as desired.

Price, per 100..... net, \$3.00

RESPIRATORS AND RECEIVERS



No. 3082



No. 3084



No. 3086

3082 Receivers for Retorts. Glass, plain.

Capacity.....oz.	4	8	16	32
Each.....	\$0.15	.20	.25	.30

3084 Receivers for Retorts. Glass, with tubulature and glass stopper.

Capacity.....oz.	4	8	16	32
Each.....	\$0.25	.35	.50	.60

3086 Respirators, Cover's Patent. Most complete device ever offered for protecting the throat and lungs from dust, poisonous gases and all other impurities.....each \$2.00

Reagent Bottles. See Bottles, pages 91, 92, 93.

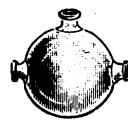
Respirator Sponges. See Sponges, page 363, No. 3294.



No. 3088



No. 3090



No. 3092

3088 Receivers, Florentine. For collecting distillates.

Capacity.....qts.	$\frac{1}{2}$	1	2
Each.....	\$0.50	.60	1.00

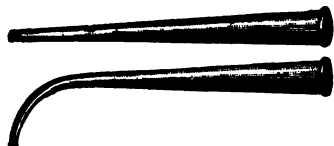
3090 Receivers. With two tubulations.

Capacity.....oz.	8	16	32
Each.....	\$0.40	.50	.60

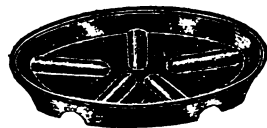
3092 Receivers. With three tubulations.

Capacity.....oz.	8	16	32
Each.....	\$0.50	.60	.80

RETORTS



No. 3094



No. 3096

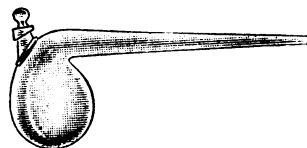
3094 Retort Adapters, straight or bent.

Wide end, diameter. inches	$\frac{1}{2}$	1	$1\frac{1}{2}$	2
Price. each	\$0.15	.20	.30	.40

3096 Rests for Bottles, to put under bottles containing acids, etc., for protecting table; of Porcelain.30c; of Hard Rubber.25c.



No. 3098



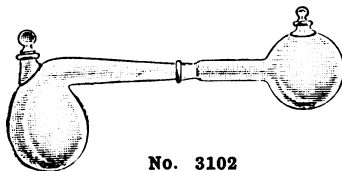
No. 3100

3098 Retorts, Bohemian glass, plain.

Capacity...	2 oz.	4 oz.	8 oz.	16 oz.	32 oz.	$\frac{1}{2}$ Gal.	1 gal.
Price.. each	\$0.12	.15	.22	.28	.35	.50	.75

3100 Retorts, Bohemian glass, with tubulature and glass stopper.

Capacity..	2 oz.	4 oz.	8 oz.	16 oz.	32 oz.	$\frac{1}{2}$ gal.	1 gal.	2 gal.
Price, each	\$0.20	.25	.35	.45	.60	.90	1.25	2.50



No. 3102

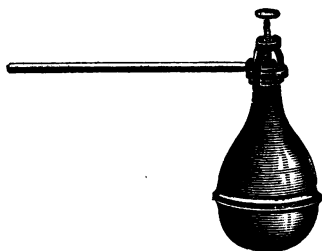
3102 Retorts, with ground-in receiver, glass stoppered.

Capacity. oz.	4	8	16
Price. each	\$0.75	1.00	1.50

3104 Retorts, Porcelain, with tubulature and stopper.

Capacity. oz.	4	8	16
Price. each	\$1.25	1.50	1.75

RETORTS



No. 3106

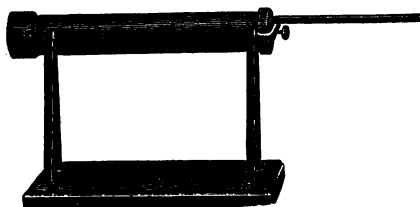


No. 3108

3106 Retorts, Copper. For generating oxygen; with iron clamp and brass delivery tube.

Capacity.....pts.	$\frac{1}{2}$	1	2	4
3108 Each.....	\$2.25	2.50	3.00	3.50

Retorts, Iron. For generating oxygen; dimensions, 11 inches deep, 7 inches in diameter. Cover is turned and fitted with asbestos packing, each..... \$5.00



No. 3110

3110 Retorts, Iron. Cylindrical form, for making large quantities of oxygen, consisting of barrel $15\frac{3}{4}$ inches long, 2 inches inside diameter, with exit tube, on support..... 4.00



No. 3112



No. 3114

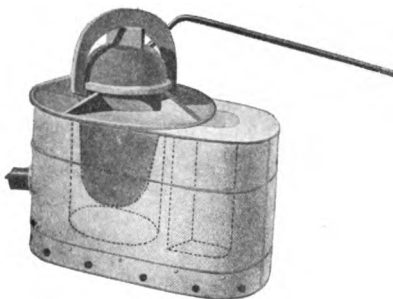
3112 Retorts, Iron. For mercury distillation, etc.; movable cover fastened by screw clamp and milled smooth, making it absolutely tight fitting.

Capacity.....pts.	$\frac{1}{2}$	1	2	4	8	16
Each.....	\$2.25	2.50	2.75	3.50	5.00	6.00

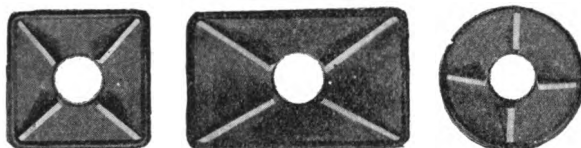
3114 Retorts, Nevada or Oval Type. Complete, with iron delivery tube.

Capacity.....pts.	3	4	5	6	10
Holds quicksilver.....lbs.	38	50	63	75	125
Weight.....lbs.	18	25	30	44	65
Each.....	\$7.00	8.00	9.00	10.50	12.00

RETORT PLATES AND ROASTING DISHES



SHOWING RETORT PLATE IN USE



Nos. 2-3

No. 1

Nos. 4-5-6-10

SHOWING SHAPES OF RETORT PLATES

No. 3116

3116 The plates illustrated above are for use with our furnaces when it is desired to use an iron retort for distilling mercury. Everyone who has done this work has noticed the difficulty experienced in propping up the retort in such a manner that it will remain in a stable condition, and yet allow the bottom to receive the greatest amount of heat.

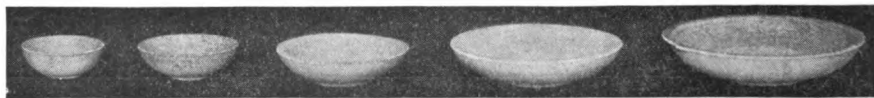
As will be seen in the illustration, with the plate in position in the furnace, the greatest possible amount of surface is exposed to the action of heat, and this causes distillation to proceed with great rapidity. These plates are made of the best cast iron and well finished in several styles and sizes to fit our various furnaces; they will be found of great use in an assay laboratory.

Plate Number	Fits Dome Top of Iron Retort Size, Pts.	May Be Used with These Furnaces	Net Weight	Price Each
1	1	No. 30.....	5½ lbs.	\$1.50
2	2	Nos. 9, 10, 11, 30, 31.....	8½ lbs.	1.50
3	3	Nos. 9, 10, 11, 13.....	8½ lbs.	1.50
4	4	Nos. 10, 11, 12.....	9 lbs.	1.50
5	5	Nos. 10, 11, 12.....	10 lbs.	1.50
6	6	Nos. 11, 12.....	9 lbs.	1.50
10	10	Nos. 11, 12.....	10 lbs.	1.50

Riddles, Sand. See Sieves, page 358, No. 3234.

Rings, Concentric. See Water Baths, page 407, Nos. 3820-3822.

Rings for Supports. See Supports, page 372, Nos. 3408-3410.

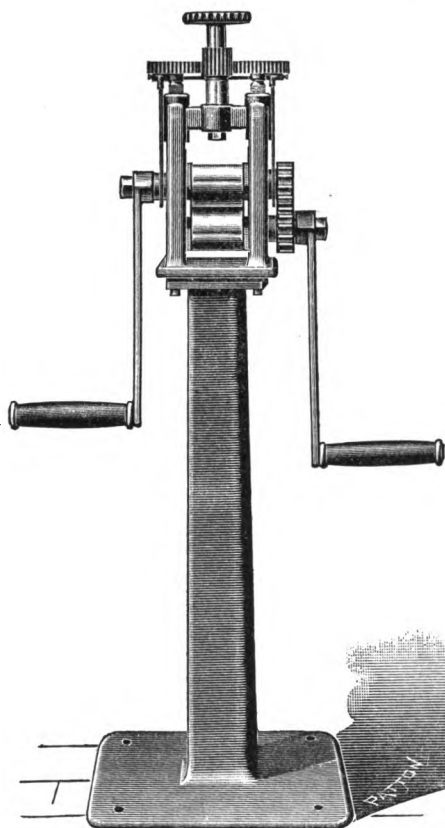


No. 3118

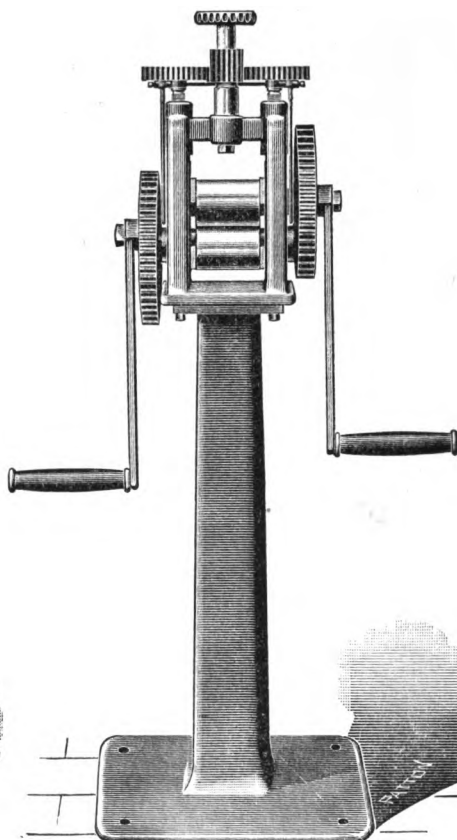
3118 Roasting Dishes. Of clay, very shallow, "Colorado."

Diam.....inches.	3	4	5	6
Per Doz....	\$0.80	.90	1.10	1.75

ROLLING MILLS



No. 3120



No. 3122

3120 Rolling Mills, Hand. Improved single-gearred, with flat rolls.

No.....	2	3	4
Rolls.....inches	$1\frac{1}{2} \times 2$	$2\frac{1}{4} \times 3$	$2\frac{3}{4} \times 4$
Weight.....pounds	80	145	190
Each.....	\$30.00	\$50.00	\$75.00

3122 Rolling Mills, Hand. Improved double-gearred, with flat rolls.

No.....	3	4
Rolls.....inches	$2\frac{1}{4} \times 3$	$2\frac{3}{4} \times 4$
Weight.....pounds	180	225
Each.....	\$75.00	\$100.00

These Mills have all the latest improvements, including improved lifting device, which, by dispensing with all inner boxes and springs, makes it convenient to interchange rolls.

RUBBER GOODS



No. 3124



No. 3126



No. 3128



No. 3132

- 3124 **Laboratory Aprons.** Made of rubber cloth, will be found a great protection to clothes as they are ample size, 36 inches wide by 50 inches long.
Each..... \$0.75
- 3126 **Rubber Bulbs.** For pipettes.
Capacity..... cc. 2 5 10 25 50
Each..... \$0.05 .05 .10 .20 .25
- 3128 **Rubber Bulbs.** With valve, capacity, 50 cc..... .40
- 3130 **Rubber Bulbs or Hand Bellows.** With valve; two bulbs, for use with blow pipes, etc., giving a continuous blast..... 1.50
- 3132 **Rubber Finger Cots.** Of pure gum. Sizes, small, medium large, and extra large.
Style..... Light Medium Heavy
Each..... \$0.50 .50 .50
- 3134 **Rubber Pads.** Of pure gum, $\frac{1}{2}$ inch thick, for dressing amalgamating copper plates.
Size..... inches 4x6 6x6
Each..... \$1.00 1.25



No. 3136



No. 3136

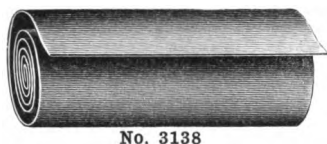


No. 3136

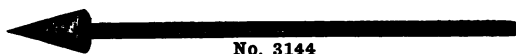
3136 Rubber Stoppers. Pure gum. Made in solid, one-hole and two-hole.			
No.	Large End	Small End	No. to lb.
00	14 mm.	10 mm.	180
0	15 mm.	11 mm.	120
1	18 mm.	14 mm.	90
2	20 mm.	16 mm.	80
3	23 mm.	19 mm.	60
4	25 mm.	20 mm.	50
5	27 mm.	23 mm.	40
6	32 mm.	26 mm.	30
7	36 mm.	30 mm.	22
8	40 mm.	34 mm.	18
9	44 mm.	36 mm.	15
10	50 mm.	41 mm.	11
11	55 mm.	50 mm.	9
12	62 mm.	54 mm.	6
13	68 mm.	57 mm.	5
Per oz.	\$0.25		Per lb. \$3.50

Specify in ordering, whether one-hole, two-hole or solid are wanted.

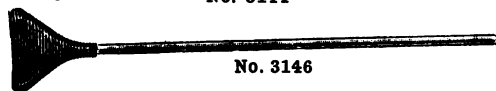
RUBBER GOODS



No. 3138

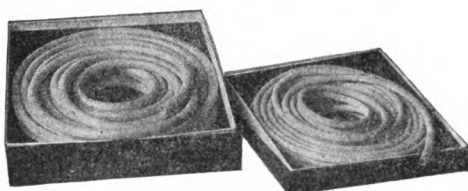


No. 3144



No. 3146

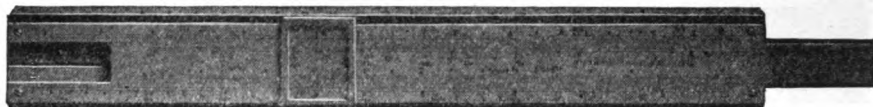
- 3138 **Rubber Sheetting.** Pure gum, unvulcanized, in rolls, 3 feet wide, light, medium and heavy, approximate, per lb. \$4.00
- 3140 **Rubber Sheetting.** Vulcanized on muslin, white, for mixing ore samples; rolls, 36 inches wide, per yard75
- 3142 **Rubber Sheetting.** Same as above, black, per yard75
- 3144 **Rubber Stirrers.** Point a, flexible cone, for washing down walls of beakers, each25
- 3146 **Rubber Tips, so called "Policemen."** To be attached to glass rod, for scraping precipitates from walls of beakers, per dozen50



Nos. 3148-3158

- | | |
|--|---|
| 3148 | *Rubber Tubing. Black, pure gum, light wall. |
| | Inside diam. . . . inches $\frac{1}{8}$ $\frac{3}{16}$ $\frac{1}{4}$ $\frac{5}{16}$ $\frac{3}{8}$ $\frac{1}{2}$ |
| | Per foot \$0.05 .07 .10 .12 .14 .20 .30 |
| 3150 | *Rubber Tubing. Black, pure gum, heavy wall. |
| | Inside diam. . . . inches $\frac{1}{8}$ $\frac{3}{16}$ $\frac{1}{4}$ $\frac{5}{16}$ $\frac{3}{8}$ $\frac{1}{2}$ |
| | Per foot \$0.06 .12 .15 .20 .30 .40 |
| 3152 | *Rubber Tubing. Red or antimony, best quality. |
| | Inside diam. . . . inches $\frac{1}{8}$ $\frac{3}{16}$ $\frac{1}{4}$ $\frac{5}{16}$ $\frac{3}{8}$ $\frac{1}{2}$ |
| | Per foot \$0.05 .10 .12 .15 .20 .25 |
| 3154 | *Rubber Tubing. Band, pure gum, light walls, for Gooch crucibles. |
| | Width, flat. . . . inches 1 $1\frac{1}{4}$ $1\frac{1}{2}$ $1\frac{3}{4}$ |
| | Per foot \$0.15 .20 .25 .30 |
| 3156 | *Rubber Tubing. White, heavy wall, best quality, hand-made, for conducting gas, etc.; in 12-foot lengths. |
| | Inside diam. . . . inches $\frac{1}{8}$ $\frac{3}{16}$ $\frac{1}{4}$ $\frac{5}{16}$ $\frac{3}{8}$ $\frac{1}{2}$ $\frac{5}{8}$ $\frac{3}{4}$ |
| | Per foot \$0.06 .10 .12 .15 .20 .25 .30 .40 |
| 3158 | *Rubber Tubing. White, light wall, hand made, for connections. |
| | Inside diam. . . . inches $\frac{1}{8}$ $\frac{3}{16}$ $\frac{1}{4}$ $\frac{5}{16}$ $\frac{3}{8}$ $\frac{1}{2}$ |
| | Per foot \$0.05 .07 .10 .12 .15 .20 |
| *The above prices on tubing are only approximate, being generally sold by the pound. | |
| 3160 | Rubber Tubing. White cloth insertion, heavy wall. |
| | Inside diam. . . . inches $\frac{1}{4}$ $\frac{3}{8}$ $\frac{1}{2}$ $\frac{5}{8}$ |
| | Per foot \$0.10 .15 .20 .25 |
| 3162 | Rubber Tubing. Extra heavy wall, for vacuum pumps, etc. |
| | Inside diam. . . . inches $\frac{1}{8}$ $\frac{3}{16}$ $\frac{1}{4}$ $\frac{3}{8}$ |
| | Per foot \$0.10 .15 .25 .40 |

CHEMISTS' SLIDE RULES



No. 3164

The performance of multiplication and division was greatly simplified by the introduction of logarithms by Briggs. It was attempted as far back as the beginning of the 17th century to represent logarithms graphically, and this attempt led to the invention of the slide rule. The logarithmic method transforms multiplication into addition and division into subtraction.

It is the purpose of this instrument to effect a reduction of the time required for the calculation of chemical analysis to a few seconds, and at the same time to increase the accuracy of the results. The calculations for which it serves include multiplication, division, and the determination of various powers of numbers. The extraction of roots is also possible, but being somewhat more complicated and not being required in a chemists' ordinary work, omitted from this pamphlet.

CALCULATION OF ANALYSIS

This involves the use of proportion and may be expressed by the equation $\frac{F \times P}{S} =$ percentage, in which F is the factor, P is the amount of substance found, and S is the quantity taken. As the factors are constant numbers they have a fixed place on the slide rule, and are indicated by a mark on the scale. Certain elements are determined in different forms of combination and have consequently different factors. The marks corresponding to the factors are placed above the logarithmic divisions in order not to cause confusion. In the calculation the runner must always be employed. In the case of elements or atomic groups, which are always determined in one and the same form of combination, for example carbon as CO_2 , hydrogen as H_2O , there is entered in large letters along with the factor the symbol of the element or atomic group. In the case of elements which may be determined in different forms of combination the symbols of these different forms are expressed by smaller letters. The fact that the factors appear distributed both on the rule and on the slide promotes clearness and facilitates the readings.

Net, each \$9.00

RULES, SAMPLERS, ETC.

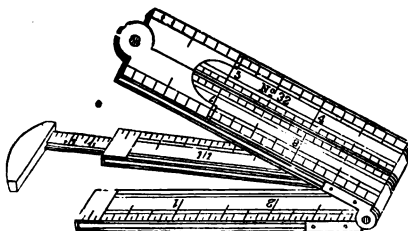


No. 3166



No. 3170

3166	Rubber Hose Connections. Brass, with hydrant thread.....	\$0.50
3168	Same as above, with $\frac{3}{4}$ -inch I. P. female thread .....	.50
3170	Same as above, but with Male I. P. thread.....	
	Size.....inches	$\frac{1}{4}$ $\frac{3}{8}$ $\frac{1}{2}$
	Each.....	\$0.15 .20 .25



No. 3176

3172	Rules. Of boxwood, 30 cm. and 12 inches	\$0.20
3174	Rules. Of boxwood, 60 cm. and 24 inches, four-fold.....	.40
3176	Rules. Of boxwood, Metric and English, 30 cm. and 12 inches, folding....	.40
3178	Rules, Meter Sticks. 1 meter on one side in millimeters, and 39 inches in one-eighths on the other.....	.40

Rules, Chemists, Slide. See page 352, No. 3164.

SAMPLERS



No. 3180

3180	Sampler for Concentrates or Sand, Etc.						
	Size	inches	12	18	24	30	36
	Each		\$1.50	1.75	2.00	7.00	8.00
	The 30 and 36-inch sizes, have T handles.						

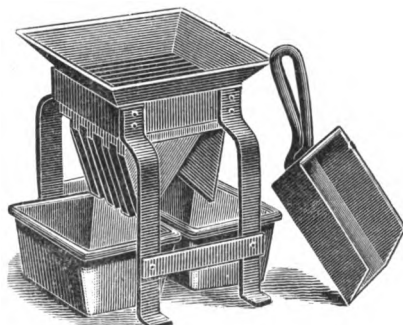
The 30 and 36-inch sizes, have T handles.

" JONES " ORE SAMPLERS

3182 Its construction facilitates quick and even sampling. It consists of hopper set in 4-legged support, scoop and 4 sampling pans and brush. All parts can be easily cleaned.

Size, inches.....	4x4	6x6	8x10
Width of trays, inches..	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$
Price complete, each...	\$8.00	10.00	15.00

Larger sizes made to order.

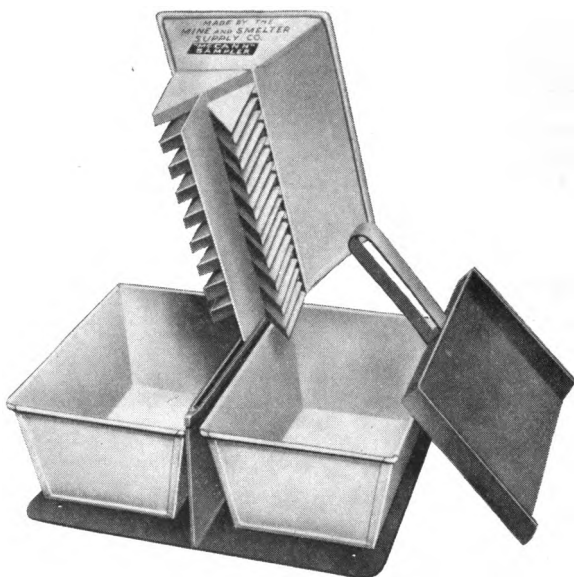
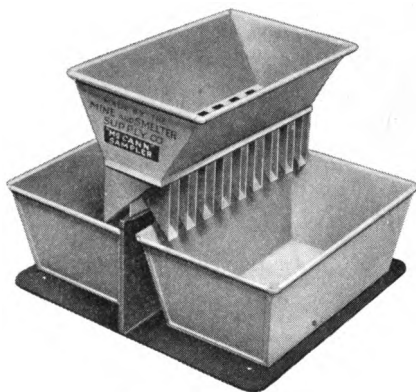


No. 3182

EXTRA BRUSHES

Price, each	\$0.30
Price, per dozen.....	3.00

McCANN IMPROVED SAMPLERS



No. 3184

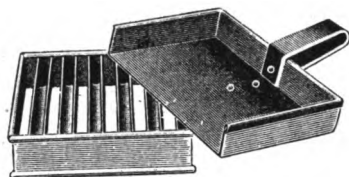
The McCann Sampler. An improvement on all others—the heavy metal base forms the sampler support and pan stop, eliminating the clumsy frame work heretofore used. The short riffles, easily cleaned, reduce to a minimum the danger of salting. This sampler is especially constructed for rapid work.

Made in three stock sizes, as follows:

Size.....	inches	4x6	6x10	8x12
Price.....	each	\$8.00	10.00	12.00

Larger sizes made to order, prices on application.

SAMPLERS



Nos. 3186-3190



No. 3194



No. 3196

3186 Sampler and Scoops. Trays, $\frac{1}{2}$ inch wide.

Size.....inches	6x6	9x9	12x12
Each.....	\$1.50	2.50	3.00

3188 Samplers..... only \$1.00 1.75 2.00

3190 Scoops..... only \$0.50 .75 1.00

3192 Sample Bags. Of duck, for ore as used by mills, etc.

Size.....inches	6x10	6x12	8x10	7x14	9x15	10x21	14x25	17½x24
Per dozen.....	\$0.50	.60	.60	.75	1.00	1.50	2.35	3.00

Any size made to order.

Sample Bags of Paper. See Paper, page 327, No. 2922.

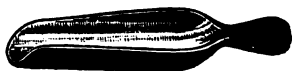
Sampling Drills. See Drills, page 181.

3194 Sampling Pans. For ore samples, of seamless tin.

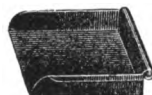
Diameter.....inches	5	6	7	8	10
Dozen.....	\$0.35	.40	.50	.70	.90

3196 Sampling Pans. For ore samples, of enameled steel.

Diameter.....inches	5¼	6	6¾	7¾	10
Each.....	\$0.15	.20	.25	.30	.35
Dozen.....	\$1.50	2.00	2.50	3.00	3.50



No. 3198



No. 3200

198 Sampling and Mixing Horn. Bowl, $5 \times 1\frac{1}{2}$ inches at largest diameter.

Each.....	\$0.30
Dozen.....	3.00

3200 Sampling and Amalgamating Scoop. Russia iron. Size, $5 \times 4\frac{1}{2}$ inches.

Each.....	.40
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3202 Same as above, with wood handle.....each .75

SCOOPS, SAND BATHS, ETC.



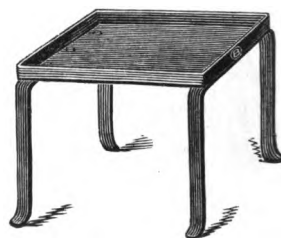
No. 3204



No. 3206



No. 3208



No. 3210

3204 Sampling Scoops. Horn.

No.	1	2	3
Size bowl.....in.	$3\frac{1}{4} \times 2\frac{1}{2}$	$3\frac{3}{4} \times 2\frac{3}{4}$	$4\frac{1}{2} \times 3\frac{1}{4}$
Each.....	\$0.15	.15	.20
Per dozen.....	\$1.25	1.60	2.25

3206 Sand Baths. Sheet iron, shallow.

Diam.....in.	3	4	5	6	8	10
Each.....	\$0.10	.12	.15	.20	.30	.50

3208 Sand Baths. Sheet iron, hemispherical.

Diam.....in.	4	5	6	8	10
Each.....	\$0.15	.20	.25	.45	.70

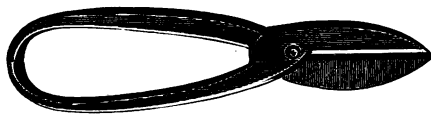
3210 Sand Baths, or Hot Plates. Iron tray on four legs.

Size.....in.	6x8	8x10	10x12
Price.....each	\$2.00	2.25	2.50

3212 Scoops, Tin. For fluxes, etc.

Width of bowl.....in.	5	6	7
Each.....	\$0.35	.40	.50

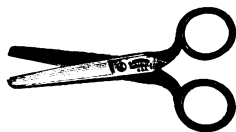
Scrapers. See page 388, No. 3592.



No. 3214

3214 Shears, Brown's. Polished steel.

Length.....in.	6	7	8	10
Each.....	\$1.00	1.20	1.40	1.60



No. 3216

3216 Scissors, Pocket. Forged steel.

Length.....in.	4	5
Each.....	\$0.40	.50



No. 3218

3218 Shears, Hand. For cutting paper, etc.

Length.....in.	10	11	12
Each.....	\$0.75	1.00	1.20

3220 Shears, Hand. For cutting metal. Tinnern's snips.

Length of cut.....in.	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4
Each.....	\$1.50	2.00	2.50	3.00

SCORIFIERS



Nos. 3222-3224

Our scorifiers, manufactured by the Colorado Crucible & Clay Company (for whom we are sole agents), are something of which we are especially proud. They are extremely satisfactory, and we recommend them without hesitation. Most careful attention has been paid in their manufacture to arrive at a mixture which is not too porous, nor on the other hand too close, endangering cracking.

3222 Scorifiers. Regular or deep pattern.

Diameter.....in.	1½	2	2¼	2½	2¾	3	3½	4
Price per 1000....	\$12.00	12.00	12.00	13.00	16.00	20.00	25.00	30.00
No. in bbl.....	3850	2000	2000	1900	1400	1000	800	600
Gross wt.....lbs.	250	285	305	310	290	290	275	275

3224 Scorifiers, Bartlett Style. Shallow bowl, especially recommended for use where a large oxidizing surface is desired, for instance, in the scorification of a heavy sulphide ore.

Diameter.....in.	2¼	2½	3
Price per 1000.....	\$12.00	13.00	20.00
No. in bbl.....	1900	1700	950
Gross wt.....lbs.	295	285	275

SIEVES



No. 3226



No. 3228



No. 3232

3226 Sieves. Brass cloth, tin frames, with pan bottom.

No. of Meshes per Lin. Inch	Number of Wire	Size of Opening Inches	PRICE, EACH		
			8 In Diam.	10 In. Diam.	12 In. Diam.
10	24	.0799	\$1.25	\$1.50	\$2.00
20	28	.0335	1.25	1.50	2.00
30	30	.0195	1.50	1.60	2.10
40	33	.0147	1.50	2.20	2.30
50	35	.011	1.50	2.25	2.50
60	36	.0091	1.75	2.50	2.75
70	37	.0077	1.75	2.50	2.75
80	38	.00675	2.00	2.75	3.00
90	39	.0061	2.00	3.00	3.20
100	40	.0055	2.50	3.25	3.50
120	42	.0043	3.00	3.50	4.50
150	44½	.0036	4.00	5.50	7.50
200	47	.002	6.00	8.00	10.00

3228 Sieves. As above, 8 inches diameter, in nests of 7, viz.: 20, 30, 40, 50, 60, 80 and 100 mesh \$10.00

We are prepared to nest above to suit purchaser. Sieves of any other diameter made to order and invoiced out at lowest figures.

3230 Sieve Covers. For above.

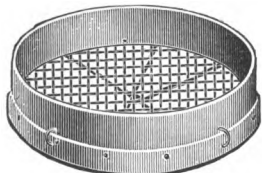
For sieves, diameter.....inches	8	10	12
Each.....	\$0.40	.50	.60

3231 Pan Bottoms. For above.

For sieves, diameter.....inches	8	10	12
Each.....	\$0.30	.40	.50

3232 Sieves. Brass cloth, with seamless brass frame, in nests of 1 each, 20, 40, 60, 80 and 100 mesh, with one cover and bottom pan.

Diameter.....inches	5	6	8
Per set.....	\$6.50	8.50	10.00



No. 3234

3234 Sieves. Wood frame S. C. Foundry riddles, 18 inches diameter, with double crimped iron cloth; mesh, 2, 4, 6, 8, 10, 12, 16 and 20.
Each..... \$0.75

SILICA WARE

The manufacture of articles of fused silica or quartz has engaged the attention of many experimental workers during the past few years, owing to the remarkable properties possessed by the material and the possibility of utilizing it for scientific and technical purposes, for which platinum or similar costly materials have only been available.

Vitreosil is unaffected by acids with the exception of hydrofluoric, and at high temperatures phosphoric. The action of phosphoric acid on silica only commences above $400^{\circ}\text{C}.$, so that for all ordinary purposes it can be safely used with this acid.

Sulphuric, nitric, and hydrochloric acids, or a mixture of acids, such as aqua-regia, have absolutely no action on the material.

As an electrical insulator vitreosil is superior to glass, porcelain, and similar materials, the resistance decreasing much more slowly with rise of temperature.

It also possesses the further advantage that moisture does not condense on its surface, and in consequence the surface leakage is much smaller than is the case with glass and materials of a ceramic nature.

Pure fused silica ware possesses the following valuable properties:

It is very refractory, melting above $1500^{\circ}\text{C}.$

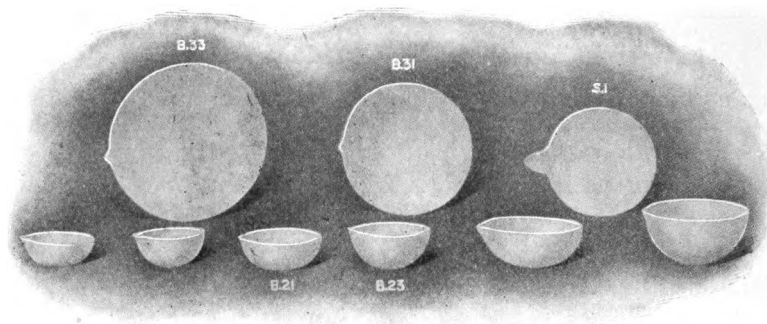
It possesses a low coefficient of expansion, about $\frac{1}{7}$ th of that of glass, and is therefore unaffected by sudden and extreme changes of temperature.

It is not attacked by acids (excepting hydrofluoric).

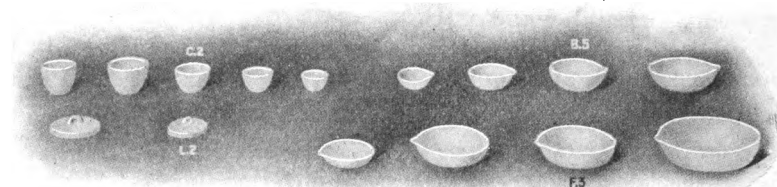
It has high electrical insulating properties, which are retained to a large degree even at high temperatures.

Quotations for any special sizes and shapes will be given on application.

SILICA WARE



No. 3236



Nos. 3238-3242

3236 Evaporating Dishes, deep shape.

Diameter...inches	2	2 $\frac{3}{4}$	3 $\frac{1}{4}$	3 $\frac{1}{2}$	4	6	7
Depth.....inches	$\frac{1}{8}$	1	1 $\frac{1}{4}$	$\frac{7}{8}$	1 $\frac{1}{4}$	2 $\frac{1}{2}$	2 $\frac{3}{4}$

Price..... each \$1.00 1.15 1.25 1.35 1.60 3.15 3.75

3238 Evaporating Dishes, flat shape.

Diameter...inches	2 $\frac{1}{2}$	2 $\frac{7}{8}$	3 $\frac{3}{4}$	4 $\frac{7}{8}$
Depth.... inches	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{7}{8}$

Price..... each \$1.15 1.25 1.35 1.85

3240 Crucibles.

Diameter at Top...inches	1 $\frac{5}{8}$	1 $\frac{5}{8}$	1 $\frac{7}{8}$	2 $\frac{1}{4}$	2 $\frac{5}{8}$	2
Height.....inches	$\frac{3}{4}$	1	1 $\frac{1}{8}$	1 $\frac{3}{8}$	1 $\frac{3}{4}$	2

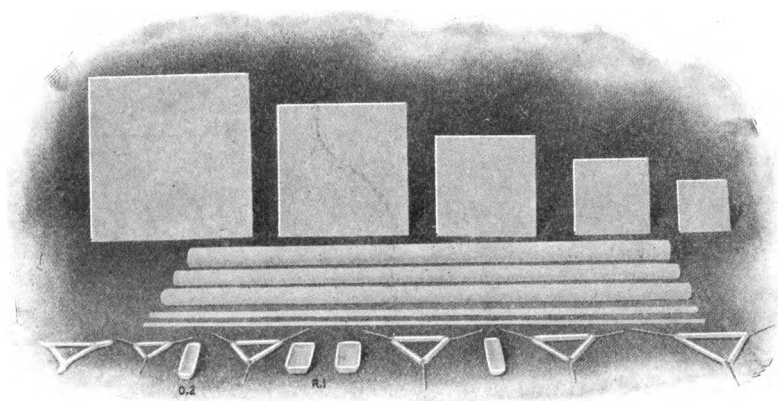
Price..... each \$0.60 .60 .75 .90 1.25 1.25

3242 Crucible Lids, for above.

Diameter.....inches	1 $\frac{3}{4}$	2	2 $\frac{3}{8}$	2 $\frac{3}{4}$
Height.....inches	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

Price..... each \$0.50 .60 .75 .90

SILICA WARE



Nos. 3244-3254

3244 Combustion Boats, without Handle.

Length.....	inches	1¾	3	3	4
Width.....	inches	½	½	⅝	⅝
Depth.....	inches	¼	¼	⅜	⅜
Each.....		\$0.50	.75	.90	1.15

3246 Muffles.

Length.....	inches	4½	9½	15
Width.....	inches	2⅝	6⅝	11
Height.....	inches	2⅝	4½	6
Each.....		\$1.85	4.25	10.00

3248 Plates.

Thickness.....	inches	⅛	⅛	⅛	⅛
Dimensions.....	inches	4x4	6x6	4x4	6x6
Each.....		\$0.30	.65	.85	1.90

3250 Triangles, on Nickel Wire.

Size.....	inches	1½	2	2½
Each.....		\$0.20	.20	.25

3252 Triangles, all Silica.

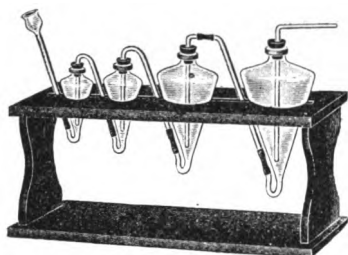
Size.....	inches	1½	2	2½
Each.....		\$0.75	.75	.90

3254 Tubes—for Combustion.

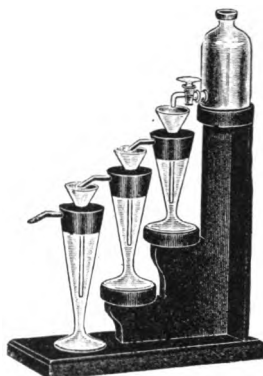
Bore.....	inches	⅝	⅝	⅝	⅝
Length.....	inches	24	36	24	36
Each.....		\$3.20	4.80	3.40	5.10

Measurements given are inside measurements.

SOIL ANALYSIS APPARATUS

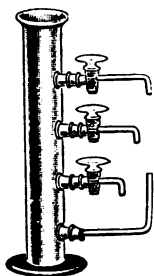


No. 3256



No. 3258

- 3256 Elutriating Apparatus, Noebel's. The complete set, capacity of reservoirs, $\frac{1}{2}$, 1, 2 and 4 pints, with support.....\$ 7.50
Glass parts, only 4.00
- 3258 Elutriating Apparatus, Schulze's. Consisting of 3 test bottles, with funnel top, aspirator bottle and support..... 12.00



No. 3260



No. 3264



No. 3268

- 3260 Elutriating Apparatus, Knop's. 20 inches high and $3\frac{1}{4}$ inches in diameter, with 4 tubulatures; 30 p which with stop-cocks, and one with tube, fitted with rubber stoppers.....\$10.00
- 3262 Elutriating Apparatus, Hilgard's. With string arrangement, nicely finished, without dial or connecting tube..... 25.00
- 3264 Elutriating Flasks, Benningson's. Capacity of bulb about 300 cc. with neck graduated to 40 cc. in 1 cc..... 1.50
- 3266 Sieves for Soil Analysis. Sets of three, one with each $\frac{1}{2}$, 1 and 2 mm. holes, in seamless brass frames, with one bottom and one cover.
Diameter.....inches 4 5 8
Per set of three.....\$6.00 8.00 10.00
- 3268 Solution Apparatus. Designed for dissolving solids, which are difficultly soluble, without the aid of heat or agitation, and filtering the solution at the same time. Complete, as illustrated..... 6.00

SPATULAS AND SPOONS, ETC.



No. 3272

No. 3276

No. 3280

Soldering Blocks. See Carbon, page 116, No. 1270.

Soldering Iron Heaters. See Gasoline Torches, page 259.

3270 Soldering Coppers. With handles.

	Weight.....	lbs.	1	1¼	1½	2		
	Each.....		\$0.60	.75	.90	1.20		
3272	Sodium Spoons. With handles.....				each	\$0.40		
3274	Spatulas. Bone. Best quality; length, 5 inches.....				each	.15		
3276	Spatulas. Glass. With ground blade; length, 6 inches.....				each	.20		
3278	Spatulas. Horn. Best quality, very elastic.							
	Length.....	inches	6	7	8			
	Each.....		\$0.12	.15	.20			
3280	Spatulas. Horn. Double ends, superior quality.							
	Length.....	inches	4	5	6	7	8	10
	Each.....		\$0.08	.10	.12	.15	.20	.35
3282	Spatulas. Nickel, Solid. Spatula on both ends.							
	Length.....	inches	5	6	7	8		
	Each.....		\$0.40	.50	.60	.80		
	Spatulas. Platinum. See Platinum Spatulas, page 335, No. 2980.							
3284	Spatulas. Porcelain. Spatula on both ends.							
	Length.....	inches	4¾	5½	7	8		
	Each.....		\$0.20	.30	.35	.40		



No. 3288

No. 3290

3286 Spatulas. Porcelain. Stout, with knob.

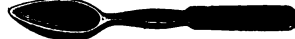
3286	Spatulas.	Resin-handle. Steel, with knob.								
		Length.....inches		11	14	17				
		Each.....		\$0.60	.80	1.00				
3288	Spatulas.	Steel. With cocoa wooden handle. For mixing and dividing.								
		Blade.....inches	3	4	5	6	7	8	10	12
		Each.....	\$0.20	.25	.30	.35	.45	.60	.90	1.50
3290	Spatulas.	Steel. Artists palette knives. Wooden handle.								
		Blade.....inches		3	4	5				
		Each.....		\$0.30	.40	.50				



No. 3292

3292 Spatulas. Steel. Nickel-plated, steel handle.

	Length.....inches	4	5	6	7	8	9
Each.....		\$0.50	.55	.60	.70	.80	1.00
3294 Sponges. For respirators.....						per dozen	\$1.50
3296 Sponges, Unbleached.....						each	\$0.50 to 1.50



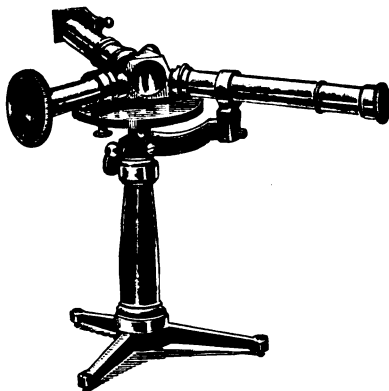
No. 3298

No. 3300

No. 3302

3298 Spoons. Ivory. For blow pipe work.....						each	\$0.25
3300 Spoons. Bone. Best quality, 6 inches.....						each	.25
3302 Spoons. Horn. Best quality, with spatula end.							
Length.....	inches	4	5	6	8	10	
Each.....		\$0.10	.15	.20	.30	.40	
Spoons, Combustion or Deflagrating. See under Combustion, page 127, No. 1434.							

SPECTROSCOPES



No. 3304

- 3304 Spectroscope**—On Adjustable Stand, with medium sized flint glass prism, observation tube and telescope of 20 mm. aperture, and 143 mm. focal distance. Provided with slit, with micrometer screw and comparison prism. Dispersion 4°\$48.00
- 3306 Spectroscope**—On Adjustable Stand, with prism of flint glass, observation tube and telescope of 20 mm. aperture and 182 mm. focal distance. Provided with scale tube, slit with micrometer screw and comparison prism. Dispersion 4°
 Accessories: Bunsen burner with air regulator and chimney, 12 tubes with platinum wire, one stand, two spectroscopic charts and five millimeter scales.....\$75.00
- 3308 Spectroscope**—Large, on Adjustable Stand, with very dense flint glass prism, enclosed in brass case. With observation tube and slit, telescope of 22 mm. aperture and 182 mm. focal distance. A gas burner with movable arm is attached to the scale tube, the adjustable slit is provided with comparison prism and micrometer screw. Focused by rack and pinion.

Accessories: Two Bunsen burners, adjustable, with chimney, 12 tubes with platinum wire and two stands, two spectroscopic charts and five millimeter scales.....\$90.00



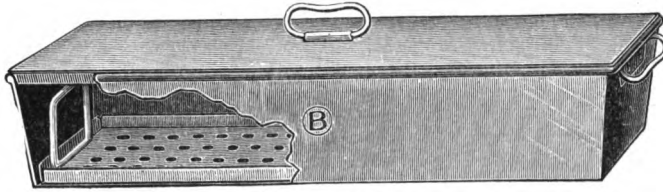
No. 3310



No. 3312

- | | | |
|-------------|--|---------------|
| 3310 | Spectrum Tubes , filled with glass..... | \$2.00 |
| 3312 | Spectrum Tubes , with two stop-cocks, for self-filling..... | 3.50 |
| 3314 | Spectrum Charts , small, plain..... | .40 |
| 3316 | Spectrum Charts , small, colored..... | .75 |
| 3318 | Spectrum Charts , large..... | 3.50 |
| 3320 | Speed Indicators , in pasteboard box..... | 1.00 |
| 3322 | Speed Indicators , in leatherette case..... | 1.50 |

STERILIZERS

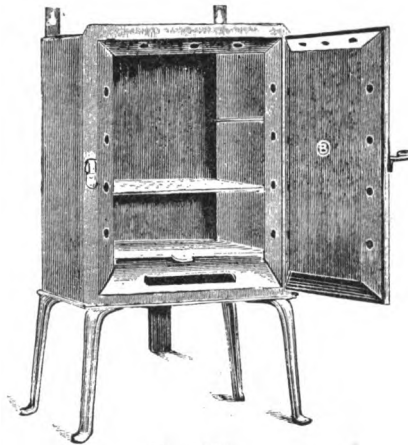


No. 3324

PORTABLE INSTRUMENT STERILIZER

- 3324 Sterilizer, Portable. Made of heavy copper, tinned inside and polished outside, with perforated tray for lifting out or immersing the instrument; is a convenient size to carry in the instrument bag. Size 15x3½x3½ inches.....each \$4.00

Larger sizes quoted on application.



No. 3326

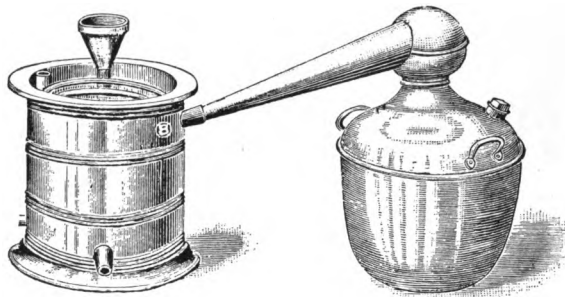
HOT AIR STERILIZERS

- 3326 Sterilizers, Hot Air. Of an upright pattern, with ears to hang up and support for burner.

9 inches high, 12 inches wide, 9 inches deep.....	each \$12.00
9 inches high, 15 inches wide, 9 inches deep.....	each 12.50
9 inches high, 18 inches wide, 9 inches deep.....	each 14.00
12 inches high, 24 inches wide, 12 inches deep.....	each 21.00
12 inches high, 9 inches wide, 12 inches deep.....	each 15.00

Larger sizes quoted on application.

STILLS



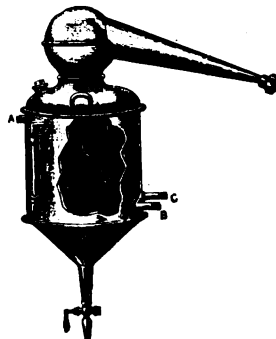
No. 3328

3328 Stills, or Distilling Apparatus. For water, spirits, etc. A tin-lined copper retort and zinc cooler, with block tin worm. All stills are tubulated and of superior make.

Capacity.....gals.	$\frac{1}{2}$	1	2	3	5
Complete.....	\$10.00	12.00	14.00	20.00	25.00
Extra parts.					
Still.....	\$6.00	7.00	8.50	13.00	16.00
Condenser.....	\$4.00	5.00	5.50	7.00	9.00



No. 3330



No. 3332

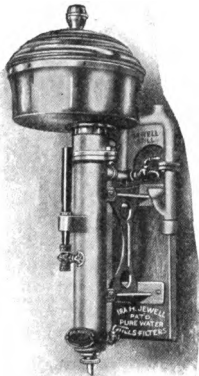
THE RALSTON NEW-PROCESS WATER STILL

3330 Is a device for purifying water by distillation and is intended for operation upon the kitchen stove or a small gas burner. You don't have to learn to run it because there is nothing to run. Fill it to the proper level with water and place it over any heating apparatus and it will distill at least one quart per hour. Under similar conditions of operation, we guarantee it to furnish a larger amount of pure water than any other still made. Price..... \$12.00

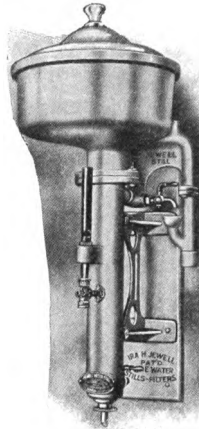
3332 Stills. For making distilled water by steam heat. Made of heavy copper with steam coil near the bottom, provided with an automatic valve which controls the water supply, also water gauge and union to connect to condenser. Very efficient and economical. Connect water inlet at A, steam inlet at C and outlet at B. Stopcock at bottom is to drain the still. Made in two sizes.

Capacity	gallons	3	5
Each.....		\$30.00	40.00

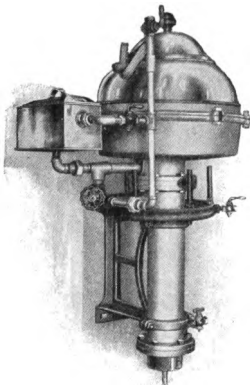
JEWELL WATER STILLS



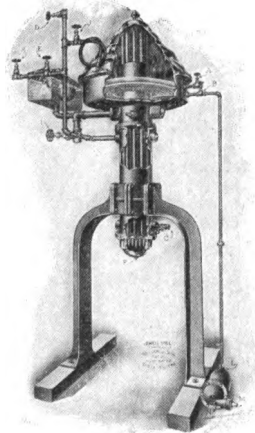
No. 3334



No. 3336



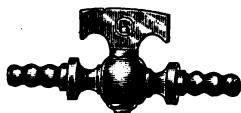
No. 3338



No. 3340

3334	Water	Stills, Jewell. Gas operated, copper nickel-plated boiling chamber, tinned inside, iron condenser. Price.....	\$ 25.00
3336	Water	Stills, Jewell. Gas operated, cast iron boiling chamber, enameled inside iron condenser. 1/2 gallon per hour. Price.....	25.00
		1 gallon per hour. Price.....	45.00
		1 1/2 gallons per hour. Price.....	65.00
3338	Water	Stills, Jewell. Gas operated, made of machined iron castings with copper dome, collecting cup and float box, tinned inside. 2 gallons per hour. Price.....	100.00
3340	Water	Stills, Jewell. Steam operated, made in capacities of from 3 gallons per hour up. May be mounted on long or short leg supports or by wall brackets. Prices on application.	

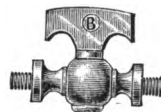
STOPCOCKS



No. 3342

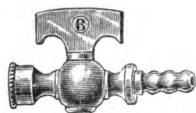


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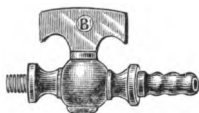


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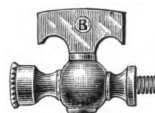
3342	Stopcocks, Brass. Both ends, nipples for tubing,	
	1/8-inch bore.....	\$0.60
	1/4-inch bore.....	.85
3344	Stopcocks, Brass. Both ends, 1/8-inch I. P. female thread,	
	1/8-inch bore.....	.50
	1/4-inch bore.....	.75
3346	Stopcocks, Brass. Both ends, 1/8-inch I. P. male thread,	
	1/8-inch bore.....	.50
	1/4-inch bore.....	.75



No. 3348



No. 3350



No. 3352

3348	Stopcocks, Brass. With nipple and 1/8-inch I. P. female thread,	
	1/8-inch bore.....	.60
	1/4-inch bore.....	.85
3350	Stopcocks, Brass. With nipple and 1/8-inch I. P. male thread,	
	1/8-inch bore.....	.60
	1/4-inch bore.....	.85
3352	Stopcocks, Brass. With 1/8-inch I. P. male and female thread,	
	1/8-inch bore.....	.65
	1/4-inch bore.....	.85



No. 3354



No. 3356



No. 3358

3354	Stopcock Nipples. With male thread,	
	1/8-inch bore.....	.15
	1/4-inch bore.....	.15
3356	Stopcock Nipples. With female thread,	
	1/8-inch bore.....	.15
	1/4-inch bore.....	.15
3358	Stopcocks, Glass. Geissler's,	
	Bore.....mm. 1/2 1 2 3 4 5 6 7 1/2 10	
	Each.....	\$0.70 .80 .90 1.00 1.35 1.85 2.50 3.50 5.50



No. 3360



No. 3362

3360	Stopcocks, Glass. Heavy, for aspirators, Woulff Bottles, etc., straight nose.	
	Bore.....mm. 4 6 8	
	Each.....	\$1.25 1.50 2.00
3362	Stopcocks. Same as above, bent.	
	Bore.....mm. 4 6 8	
	Each.....	\$1.25 1.50 2.00

STOPCOCKS



No. 3364



No. 3366



No. 3368

3364 Stopcocks, Geissler's. Glass, bored at angle of 45 degrees.
Diameter, 2 mm. \$1.50

3366 Stopcocks, Geissler's. Glass, 3-way.				
Bore.....mm.	1	2	3	5
Price.....each	\$1.00	1.20	1.50	2.00

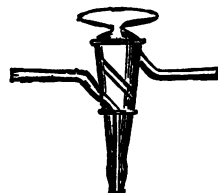
3368 Stopcocks, Geissler's. Glass, 3-way, new style.				
Bore.....mm.	1	2	3	5
Price.....each	\$1.25	1.50	1.75	2.50



No. 3370



No. 3372



No. 3374

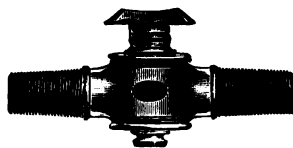
3370 Stopcocks. Glass, new style, 2 mm. bore \$1.20

3372 Stopcocks. Glass, new style, 3-way, bore 2 mm 1.50

3374 Stopcocks. Glass, new style, with downway outlet, bore 2 mm 1.60



No. 3376



No. 3378

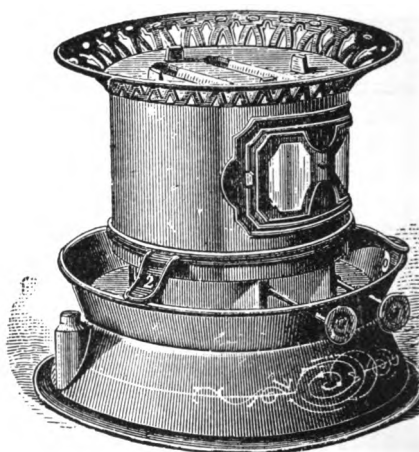
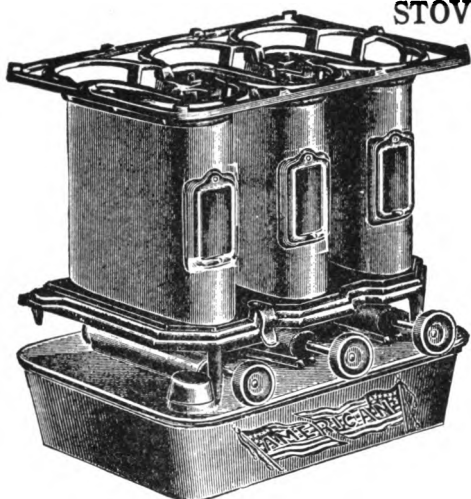


No. 3378

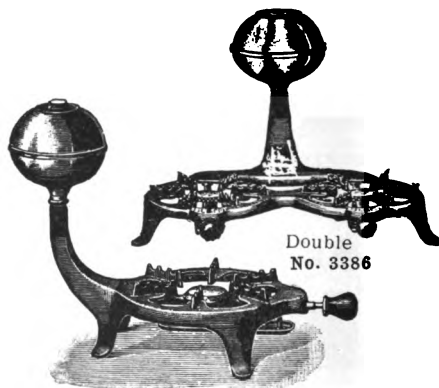
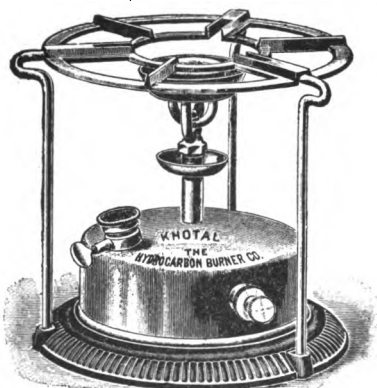
3376 Stopcocks. Hard rubber, bore $\frac{1}{8}$ inch \$0.50

3378 Stopcocks. Of glazed acid proof stoneware, straight or bent.				
Bore.....inches	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1
Price.....each	\$2.25	2.50	3.00	4.00

STOVES



	No. 3380	No. 3382	
3380 Stoves, for Kerosene. "The American."			
Width of burners.....inches	4 $\frac{3}{8}$	4 $\frac{3}{8}$	4 $\frac{3}{8}$
No. of burners.....	1	2	3
Each.....	\$1.00	2.00	3.00
3382 Stoves, for Kerosene. "Improved Summer Queen," with water pan to keep oil reservoir cool.			
Width of burners.....inches	3	3	4
No. of burners.....	1	2	3
Each.....	\$1.80	2.00	3.00

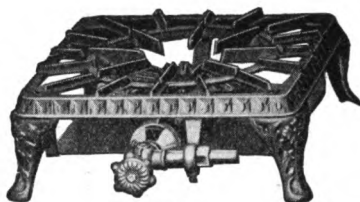


	No. 3384	No. 3386	
3384 Stoves, for Kerosene. "Khotal." Of heavy polished brass, burns kerosene without a wick. Complete with detachable tripod frame, each.....			\$5.00
3386 Stoves, Barthel's, for Alcohol. Superior to most other alcohol stoves or lamps, as they manufacture their own gas by vaporizing the alcohol. No wick is used.			
Price, single burner, japanned, each.....			3.50
Price, double burner, japanned, 2 $\frac{1}{4}$ pints capacity, each.....			5.50

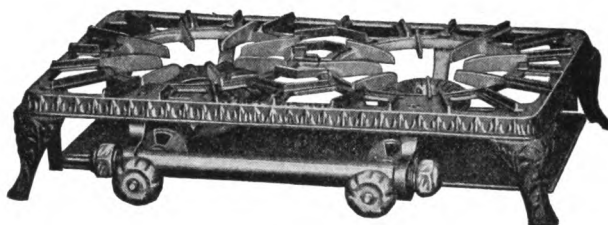
STOVES



No. 3388



No. 3390



No. 3392

3388 Stoves, Acme Junior. For gasoline.

No. of burners.....	1	2	3
Each.....	\$3.00	4.50	6.00

3390 Stoves, Gas. For laboratory use. One burner..... each \$2.40

3392 Stoves, Gas. Same as above, but with two burners..... each 4.00

3394 Stove Wicks.

Width.....in.	3	4	4 $\frac{3}{8}$
Per dozen.....	\$0.30	.40	.40

Stoves. See also Burners and Lamps, in Index.

Hot Plates and Water Heaters. See Index.

Sulphurated Hydrogen Generators. See Gas Generators, page 248.

SUPPORTS



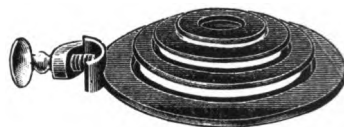
No. 3396



No. 3398



No. 3400



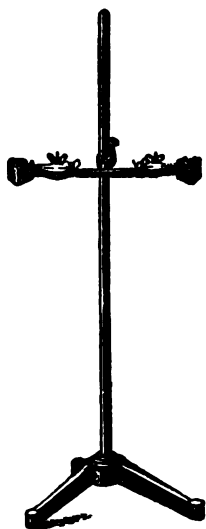
No. 3412



No. 3414

3396	Supports, Rectangular. Base and rod only. For use with any clamp.				
	Size.....	Small	Medium	Large	Ex. Large
	Base.....inches	4x6	5½x7½	6½x8½	6½x11
	Rods.....inches	16	20	24	36
	Each.....	\$0.30	.40	.65	1.00
3398	Supports, Triangular. Base and rod only. For use with any clamp.				
	Size.....	Small	Medium	Large	Ex. Large
	Rods.....inches	16	20	24	36
	Each.....	\$0.35	.50	.75	1.00
3400	Supports, Ring Stands. Rectangular, complete with rings.				
	Size.....	Small	Medium	Large	Ex. Large
	Number of rings.....	2	3	4	4
	Diam. of rings.....inches	2, 3	2, 3, 4	2, 3, 4, 5	3, 4, 5, 6
	Each.....	\$0.75	1.00	1.30	1.75
3402	Supports, Ring Stands. Rectangular base, with extension rings and holders.				
	Size.....	Small	Medium	Large	Ex. Large
	Number of rings.....	2	3	4	4
	Diam. of rings.....inches	2, 3	2, 3, 4	2, 3, 4, 5	3, 4, 5, 6
	Each.....	\$1.00	1.50	1.75	2.00
3404	Supports, Ring Stands. Triangular base, same as above.				
	Each.....	\$1.00	1.50	1.75	2.00
3406	Supports, for Burettes. Iron base, rod and clamps.				
	With clamps.....		1	2	3
	Each.....		\$0.80	1.20	1.60
3408	Support Rings. With brass screw to attach to supports.				
	Diameter.....inches	2	3	4	5
	Each.....	\$0.15	.20	.25	.30
3410	Support Rings. Extension, to attach with clamp holder.				
	Diameter.....inches	2	3	4	5
	Each.....	\$0.10	.10	.15	.15
3412	Supports, Concentric. Of iron, with clamp for attaching to retort stand.				
	Set of 3 rings, largest 6 inches.....				\$0.75
	Set of 4 rings, largest 8 inches.....				1.00
3414	Supports. Of cast iron, 5 inches diameter, with clamp for attaching to retort stand. May be used as a small hot plate, or support for Bunsen Burner, and for many other uses.....each				.50

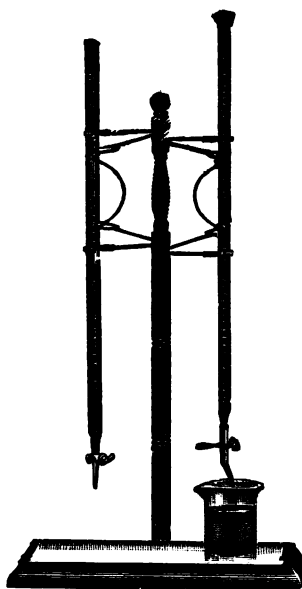
SUPPORTS



No. 3416



No. 3418



No. 3420

3416 Supports. For burettes, iron, with one double Hoffman clamp.

Each \$1.20

3418 Supports. For burettes, wood, revolving, holding 8 burettes.

Each 4.00

3420 Supports. For burettes, Chaddock's.

Hardwood base with square milk glass plate, ground to write on, clamp of japanned spring wire on turned maple upright; thumb opens the rubber-covered V-shaped jaws, which close upon the burette and hold it firm and true.

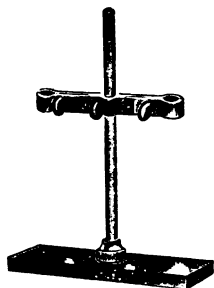
For burettes.....	1	2	3
Each.....	\$2.00	3.00	5.00

3422 Extra Milk Glass Plates. For above.

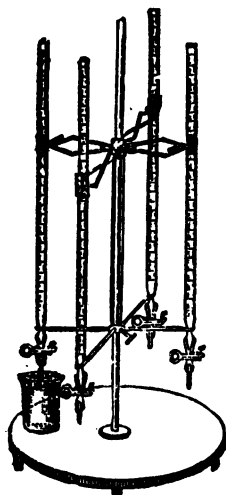
	1	2	3
	\$0.50	.50	.50

Support Rings, Iron. See Clamps, page 126, Nos. 1416-1418.

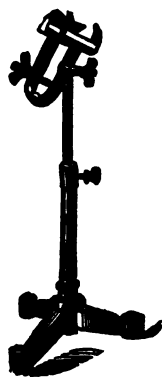
SUPPORTS



No. 3424

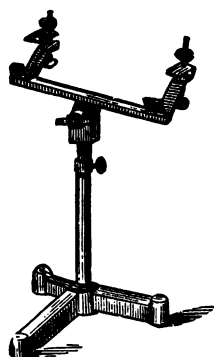


No. 3426

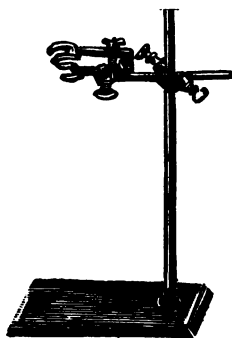


No. 3430

3424	Supports, for Burettes. Hardwood clamp, lined with cork.		
	For burettes	1	2
	Each	\$0.85	1.25
3426	Supports for 4 Burettes. Solid porcelain base, revolving clamps, a very desirable support		\$7.00
3428	Supports. Same as above, with wood base		4.00
3430	Supports, for Condensers. Iron, with universal clamp; height is adjustable		3.00



No. 3432



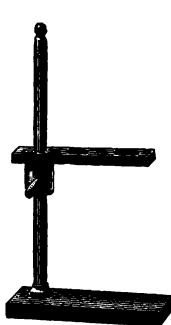
No. 3434



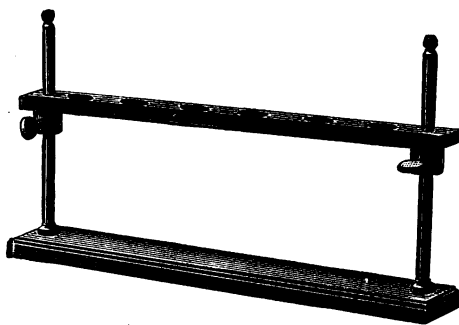
No. 3436

3432	Supports, for Condensers. Iron, with universal movement	3.00
3434	Supports, for Condensers. Iron, with Bunsen's large clamp	2.00
3436	Supports, for Condensers. Wood, for all sizes	1.50

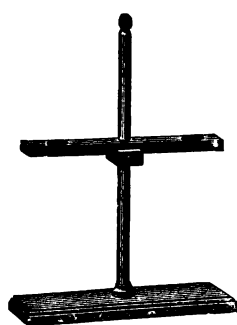
SUPPORTS



No. 3438

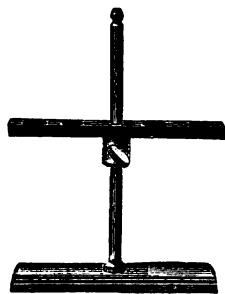


No. 3440

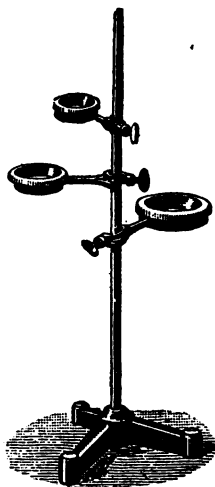


No. 3442

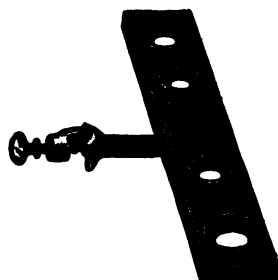
3438	Supports.	For funnels, wood, 1 arm.....	\$0.80
3440	Supports.	For funnels; for 6 funnels in one row.....	2.00
3442	Supports.	For funnels, with double arm.....	.90



No. 3444



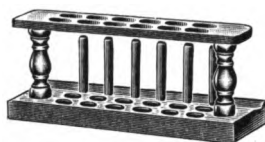
No. 3446



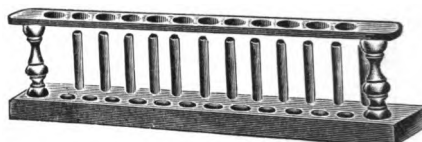
No. 3448

3444	Supports.	For funnels, wood, 1 double arm for 4 funnels.....	.90
3446	Supports.	For funnels, iron, with 3 wood-lined rings.....	1.50
3448	Supports.	For funnels, hard wood, with iron clamp; for 4 funnels; can be attached to any retort stand.....	.60

SUPPORTS

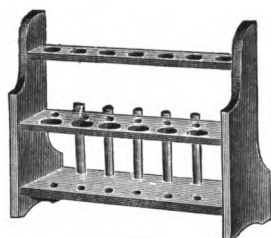


No. 3450

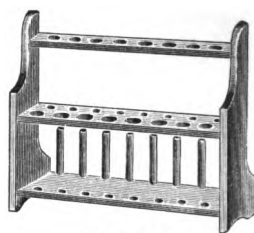


No. 3454

- 3450 Supports, for 12 test tubes, in two rows, with pins, $\frac{7}{8}$ -inch holes. Price each \$0.60
- 3452 Supports, for 6 test tubes, with pins, $\frac{7}{8}$ -inch holes45
- 3454 Supports, for 12 test tubes, in one row, with 11 tubes, heavy base, with $\frac{7}{8}$ -inch holes45

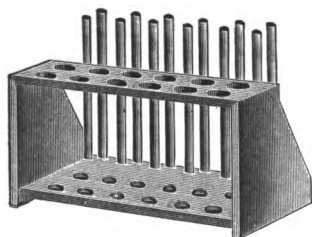


No. 3456

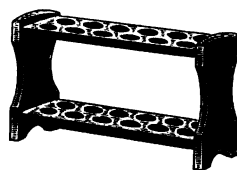


No. 3458

- 3456 Supports, for 13 test tubes, in two shelves, $\frac{7}{8}$ -inch holes \$0.45
- 3458 Supports, for 16 test tubes, in two shelves, with 7 pins, $\frac{7}{8}$ -inch holes. Price each .50



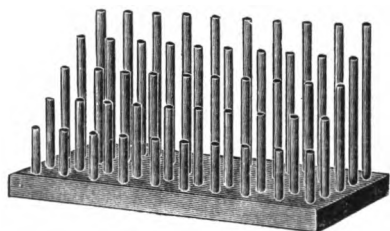
No. 3460



No. 3462

- 3460 Supports, for 12 test tubes, in two rows, with 12 pins, for "large tubes," $1\frac{1}{4}$ -inch holes \$1.00
- 3462 Supports, for 12 extra large tubes, $1\frac{1}{4}$ -inch holes60

SUPPORTS



No. 3466

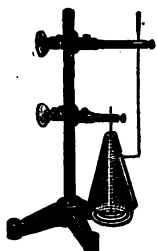


No. 3468



No. 3470

3464	Supports. For drying test tubes, with 25 pins	\$1.00
3466	Supports. Same as above, with 50 pins	1.50
3468	Supports. For pipettes, wood, revolving, holding 12 pipettes	2.50
3470	Supports, Schellbach's. Universal, wood.....	2.00



No. 3472



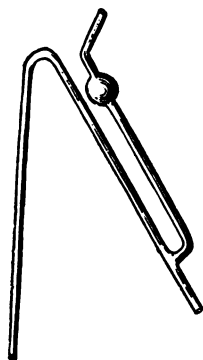
No. 3474



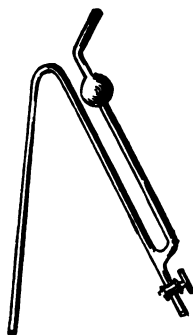
No. 3476

3472	Supports, Classen's. With two clamps	4.00
3474	Supports, Classen's. Of metal, with 1 clamp and 1 ring.....	4.00
3476	Supports. Support table, adjustable, 12-inch.....	1.50

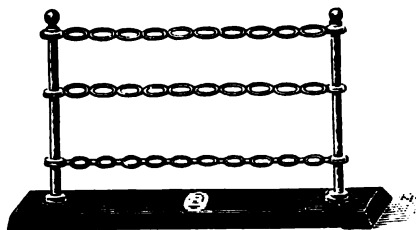
SYPHONS, TEST TUBE RACKS, ETC.



No. 3478



No. 3480



No. 3482

3478 Syphons, Glass. With suction tube.

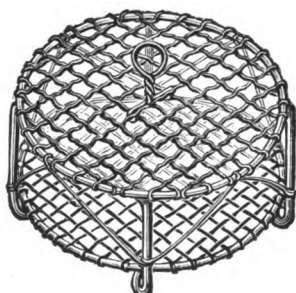
Length.....in.	8	12	18	24	30
Each.....	\$0.30	.35	.40	.60	.80

3480 Syphons, Glass. With Geissler's glass stopcock and suction tube.

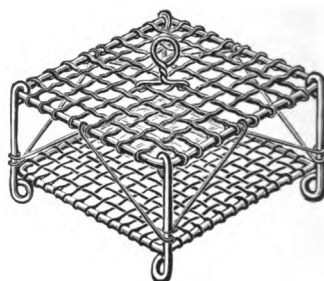
Length.....in.	8	12	18	24	30
Each.....	\$1.10	1.25	1.40	1.60	1.80

Tanks, Blow Pipe. See Furnaces, page 87.

3482 Test Tube Rack. Nickel-plated, on jappanned iron base, size, 6 inches high, 11 inches long, for 10 test tubes, each..... \$2.00



No. 3484



No. 3486

3484 Test Tube Rack. Round form, tinned wire, size, 7 inches in diameter by 3½ inches high, each..... .75



No. 3488

3486 Test Tube Rack. Square form, tinned wire, size, 7 inches by 7 inches, 3½ inches high, each..... .75

3488 Test Glasses. With lip, coming to fine evenly coned point.

Capacity.....oz.	1	2	4	6	8
Each.....	\$0.15	.20	.25	.30	.35

TEST TUBES



No. 3492



No. 3498



No. 3500



No. 3502



No. 3504

3490 Test Paper, Blue and Red Litmus and Turmeric.

In small books	Each	\$0.05	Doz.	\$0.50
In sheets	Each	.05	Quire	.60

3492 Test Paper. In tape form, perforated strips, in metal box; per box of 100 strips, red or blue..... .10

3494 Test Paper, Merck Litmus. In vials, blue, red and neutral.

Each .....	.10
Dozen	1.00

3496 Test Paper, Squibb's Litmus. Same as above.

Each .....	.15
Dozen	1.75

3498 Test Tubes. Best German glass, well annealed, free from lead, each piece wrapped in paper.

Size	in.	3x $\frac{3}{8}$	4x $\frac{1}{2}$	5x $\frac{1}{2}$	5x $\frac{5}{8}$	5x $\frac{3}{4}$	6x $\frac{5}{8}$
Doz		\$0.15	.20	.25	.25	.30	.30
Gross		\$1.50	2.00	2.25	2.50	2.60	2.80
Size	in.	6x $\frac{3}{4}$	6x1	7x $\frac{1}{2}$	8x1	9x1	10x1
Doz		\$0.30	.40	.45	.60	.80	1.20
Gross		\$3.00	4.50	4.50	6.00	8.00	10.00

3500 Test Tubes. With side neck.

Length	in.	5	6	7	8
Doz		\$0.75	.85	1.00	1.30

3502 Test Tubes. On foot.

Height	in.	5	6	7	8
Doz		\$0.75	1.00	1.25	1.50

3504 Test Tubes. Graduated; capacity 10 cc. in 1-10.....each \$0.40

Test Tubes of Hard Glass. See Tubes, page 399, No. 3740.

THERMOMETERS



No. 3506
CHEMICAL
IN WOOD CASE



No. 3522
TECHNICAL
IN ARMORED CASE



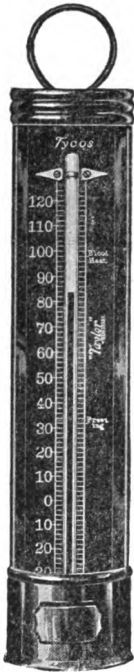
No. 3524
FLOATING
DAIRY

In making your purchases of thermometers, consider quality first. There are as many great variances in the grades of thermometers as in any known instrument. We handle only the best standard makes and recommend them where extreme accuracy is essential.

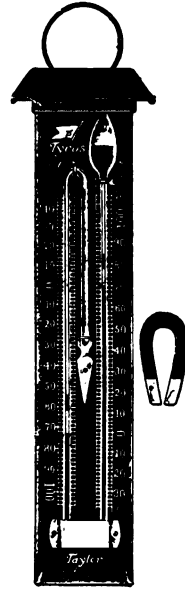
THERMOMETERS

- 3506 **Thermometers, Chemical.** Scale Engraved on Stem, with white enamel back; plain mercury tubes, good grade; in wooden case.
- | | | | | |
|---------------|---------|------|------|---------|
| Grad. to..... | -10+110 | 150 | 200 | 350° C. |
| Each..... | \$1.10 | 1.25 | 1.50 | 1.75 |
| Grad. to..... | -20+120 | 220 | 400 | 650° F. |
| Each..... | \$1.10 | 1.10 | 1.50 | 1.75 |
- 3508 **Thermometers, Chemical.** Milk Glass Scale, enclosed in glass tube; in wooden case.
- | | | | |
|---------------|---------|------|---------|
| Grad. to..... | -10+110 | 200 | 350° C. |
| Each..... | \$1.10 | 1.50 | 1.75 |
| Grad. to..... | 220 | 400 | 650° F. |
| Each..... | \$1.10 | 1.50 | 1.75 |
- 3510 **Thermometers, Chemical.** Hand Written Paper Scale, enclosed in glass tube; in paper case. Diameter $\frac{1}{4}$ inch.
- | | | |
|---------------|---------|---------|
| Grad. to..... | -10+100 | 200 |
| Each..... | \$0.70 | .85 |
| Grad. to..... | 220 | 400° F. |
| Each..... | \$0.70 | .85 |
- 3512 **Thermometers.** Paper Scale, only 8 inches long, 110° C. or 220° F..... \$0.50
- 3514 **Thermometers, Chemical.** Same grade as No. 3506, with two scales engraved on the Stem.
- | | |
|-------------------------------------|------|
| Registering 110° C. and 220° F..... | 1.50 |
| Registering 200° C. and 400° F..... | 1.75 |
| Registering 350° C. and 650° F..... | 2.25 |
- 3516 **Thermometers, Chemical.** Standard grade; Filled with Nitrogen, to prevent the separation of Mercury, Engraved on Stem, 0 to 400° C. or +30 to 750° F..... 5.25
- 3518 **Thermometers, Normal.** Standard grade; Filled above Mercury with Carbonic Acid. Graduated on Tube 0 to 540° C. or +30—1000°F..... 8.25
- 3520 **Thermometers, Chemical.** Graduated on Stem, and this one again enclosed in glass tube to prevent graduations from wearing off.
- | | | |
|---------------|---------|---------|
| Grad. to..... | 150° C. | 400° F. |
| Each..... | \$2.00 | 2.00 |
- 3522 **Thermometers, Technical.** In Armored Case to protect stem and lessen liability of breakage.
- | | | | | |
|---------------|--------|--------|---------|---------|
| Grad. to..... | 150° C | 220° F | 300° C. | 600° F. |
| Each..... | \$4.50 | 4.50 | 6.00 | 6.00 |
- 3524 **Thermometers, Floating.** Dairy, 0—150° F. Each \$0.20; Doz..... \$2.00
- 3526 **Thermometers, Floating.** Paper Scale, 8 in. long, 0—50°C.—1°..... .50
- 3528 **Thermometers, Floating.** Paper Scale, 10 in. long, 110° F. or 220° F..... .75
- 3530 **Thermometers, Brewer's.** 12 in. long, Copper Cup Case, 220° F+R..... 2.00
- We can supply thermometers of any other kind or range upon request.

HOUSEHOLD THERMOMETERS



No. 3532
TIN CASE



No. 3534
MAXIMUM AND MINIMUM

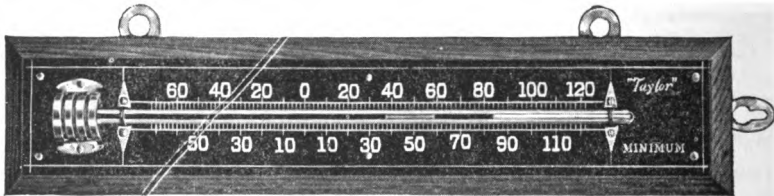
3532 Heavy tin case Thermometers for inside or outside use, especially serviceable wherever an instrument is subjected to rough treatment. Mercury bulb fully protected. Scale range, 10 to 40° below zero; for mercury tubes and 20 to 60° below for spirit tubes to 120°F. above.

Size.....	inches	8	10	12
Price.....	each	\$1.00	1.25	1.50

3534 Maximum and minimum self registering with magnet for resetting—absolutely accurate, scale range, 10 to 40° below zero to 120°F. above zero. Black oxidized brass scales, white filled figures, black japanned tinned case.

Size.....	inches	8	10
Price.....	each	\$3.50	4.00

NOTE—The Thermometers listed above are Standard quality and permanently accurate. We can furnish cheaper grades but do not recommend their use.



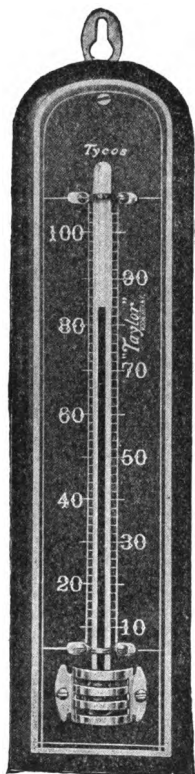
No. 3536

3536 Minimum self-registering Thermometer, golden oak back, oxidized brass scales, white filled figures.

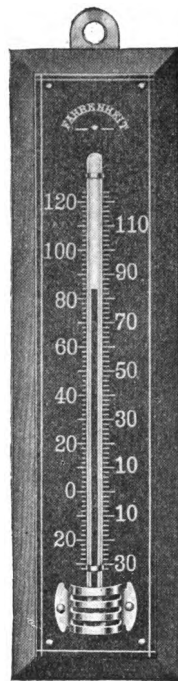
Size.....	inches	8	10
Price.....	each	\$1.00	1.25

HOUSEHOLD THERMOMETERS

CABINET



No. 3538



No. 3540

STANDARD GRADE

Special hand rub piano finish thin wood back, in mahogany, birdseye maple or golden oak. Black oxidized brass beveled-edged scales, silver deposited figures and graduations, bronze screw clasps and guards, magnifying mercury or *spirit seasoned tubes; scale range, about +20° to 100° F. Sensible thermometer for indoor use.

MAHOGANY OR BIRDSEYE MAPLE BACK OR GOLDEN OAK

3538	Price, 6-inch	\$1.50
	Price, 8-inch	1.75
	Price, 10-inch	2.25

OAK BEVEL EDGE BACK, ORDINARY GRADE

Natural Finish.

3540	Price, 8-inch	\$0.50
------	---------------------	--------

Magnifying mercury or *spirit tubes, black oxidized brass scales, white filled figures, nickeled straps and guards; scale ranging from 10 to 40° below zero to 120° F. above.

*If spirit tubes are desired, designate by letter "S."

THERMOMETERS

HOT-WATER



Nos. 3542-3544
STRAIGHT

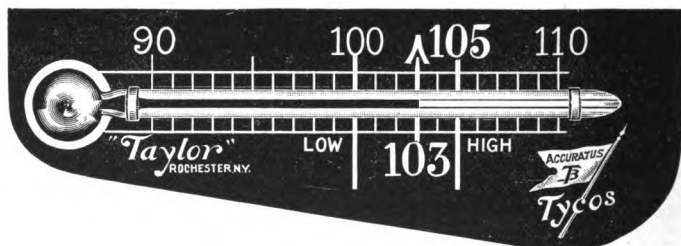


Nos. 3546-3548
ANGLE

Iron nickel-plated case, brass oxidized scales, white filled figures, 8-inch case, 2-inch stem, $\frac{1}{2}$ -inch S. P. thread. Approximate scale range, 60 to 260° F.

No.		Price
3542	Straight Stem, Magnifying Mercury Tubes	\$1.50
3544	Straight Stem, Magnifying Red Liquid Tubes	1.50
3546	Angle Stem, Magnifying Mercury Tubes	2.00
3548	Angle Stem, Magnifying Red Liquid Tubes	2.00

INCUBATOR



No. 3550

Success in operating an incubator depends more upon the accuracy of the thermometer and the proper control of temperature than upon any other feature. Thermometers are scientific instruments, and are accurate or inaccurate, reliable or unreliable, according to the intelligence and honesty of the manufacturer. The qualities which count most for accuracy and reliability are hidden to the eye, and the lack of these qualities is not apparent.

It is not a well-known fact, but nevertheless true, that glass shrinks with age, after extreme heating. This shrinkage is a factor of the most vital importance in the permanent accuracy of a thermometer.

3550	Angle Pattern, Flange on Upper Edge Turned Over so as to Hook on Wire or Metal Strip. Scale 90 to 110°. Tubes thoroughly seasoned and selected for accuracy	\$0.75
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AUTOMATIC ELECTRIC ALARM THERMOMETERS

Outer Casing



Showing Inner Construction

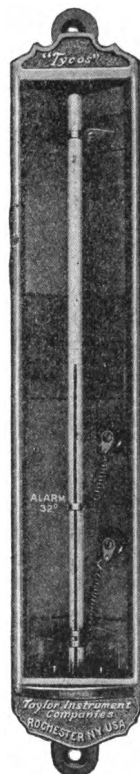
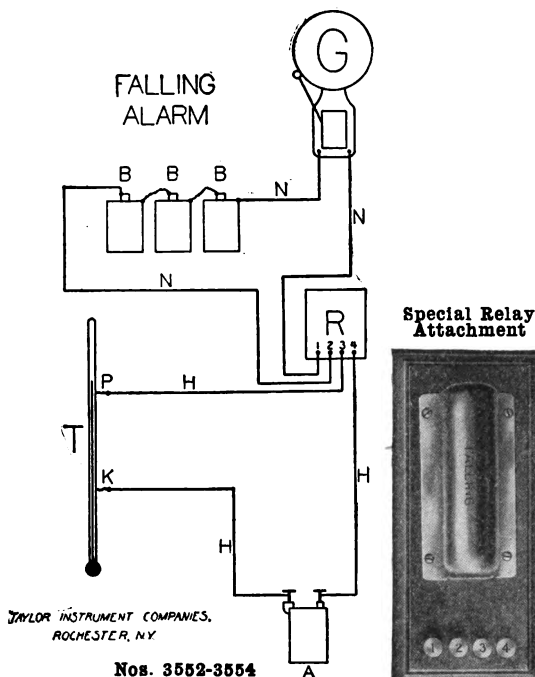
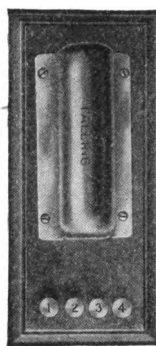


Diagram of Wiring



Special Relay Attachment



Automatic Electric Alarm Thermometers, Standard Grade, for Use in Orchards, Green Houses, Nurseries, Cold Storage Warehouses, etc.

3552 Automatic electric alarm thermometer in heavy metal weatherproof case, size 12x2 inches, arranged to ring alarm at 32° F. or any other one permanent point desired, "which must be mentioned when ordering." Complete with special relay attachment, but without batteries, bell or wire.

Price..... \$18.00

For Hop Curing, Tobacco Curing, and Many Other Purposes where an Alarm is Desired at High and Low Points

3554 Automatic electric alarm thermometer, heavy metal weatherproof case, size 12x2 inches, arranged to ring alarm at any two "permanent points" desired, "which must be mentioned in ordering." Complete with special relay attachment, but without batteries, bell or wire.

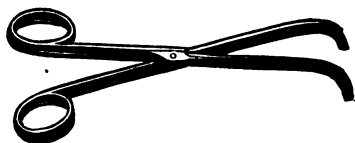
Price..... \$24.00

Price, for each Additional Contact, add to List..... 6.00

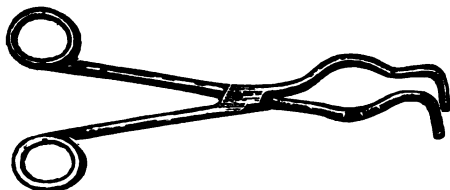
Price, Extra Relays..... 4.00

Instructions and diagrams for installing sent with each thermometer, giving full specifications of batteries and bells needed. Special circular of complete details sent on request. Special patterns made to order to suit any requirements.

TONGS

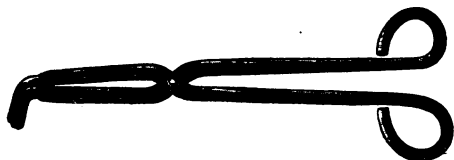


No. 3556

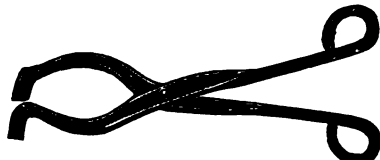


No. 3558

3556	Tongs, Crucible. Forged steel, single bent, N. P., 9 inches long	\$0.70
3558	Tongs. Same as above, but double bent. ....	.80
3560	Tongs. Same as above two tongs, with heavy platinum shoes, price according to weight of platinum; approximate price.....	8.00
3562	Tongs, Crucible. Pure nickel, double bent, 9 inches long.....	3.00
3564	Tongs, Crucible. Aluminum, double bent, 8 inches long.....	1.00



No. 3566



No. 3568

3566	Tongs, Crucible. Rod iron, single bent, japanned, 9 inches long .....	.30
3568	Tongs, Crucible. Rod iron, double bent, japanned, 9 inches long .....	.40
3570	Tongs. Same as above, 18 inches long	1.00



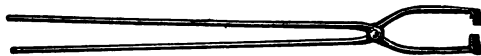
No. 3572

3572	Tongs, Crucible. Steel, single bent, 30 and 36 inches long	1.50
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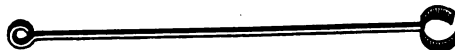
No. 3574

3574	Tongs, Crucible. Steel, double bent, 30 and 36 inches long	1.50
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No. 3576

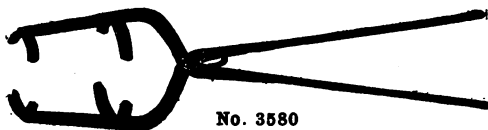
3576	Tongs, Crucible. Steel, double bent, for lifting crucibles vertically, 36 inches long	3.50
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No. 3578

3578	Tongs, Crucible. Steel, crucible lifter, to take crucibles of any size up to 30 grm., 40 inches long	1.00
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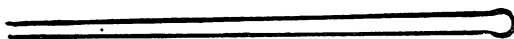
TONGS



No. 3580

3580 Tongs, Crucible. Used when lifting black-lead or other heavy crucibles with a crane.

For crucibles No.	10 to 20	25 to 50	60 to 100	125 to 150
Each.....	\$12.00	14.00	18.00	25.00



No. 3582

3582 Tongs, Cupel. Steel, light, 30 and 36 in. long, each \$1.00



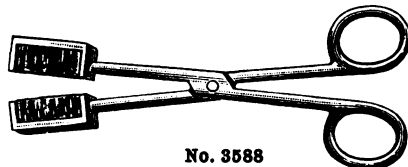
No. 3584

3584 Tongs, Cupel. Steel, light, flat round ends, 30 and 36 in. long, each 1.00



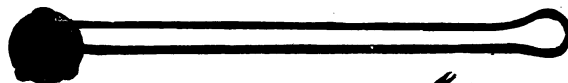
No. 3586

3586 Tongs, Scorifier and Crucible. Steel, light, 30 and 36 in. long, each 1.00



No. 3588

3588 Tongs, for Matrasses and Flasks. Brass, cork-lined, 7 in. long, each 1.00



No. 3590

3590 Tongs, Scorifier. This is a decided improvement in tongs for scorifiers, roasting dishes, etc. It is made in such a manner that one pair of tongs will handle all sizes of scorifiers and roasting dishes from 1 to 6 inches. They are made in the same manner as an ordinary cupel tong, but differ from the old style scorifier tong in that they grasp the scorifier from above, holding it in such a manner that there is no danger of its slipping. As they are applied from above, it is possible to remove a scorifier or roasting dish from the back of the muffle without disturbing those in front of it. This also permits the ready change in position of either scorifiers or roasting dishes, and one side of the tip is shaped in such a manner that the contents of the vessel may be poured through it without releasing the grip of the tongs. We believe they will be found extremely convenient in muffle work, and will replace several sizes of tongs always required for this purpose.

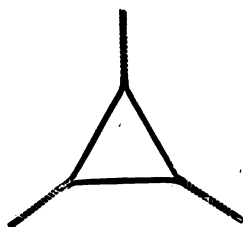
Length.....in.	24	30	36
Each.....	\$1.25	1.35	1.50

TRIANGLES

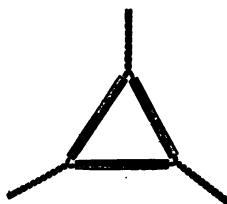


No. 3592

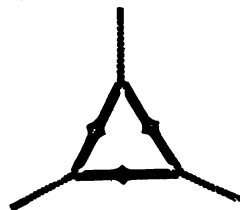
- 3592 Cupel Rake. Iron, 24 in. long \$0.50
 3594 Cupel Shovel. Iron, 24 in. long50



No. 3596



No. 3598



No. 3600

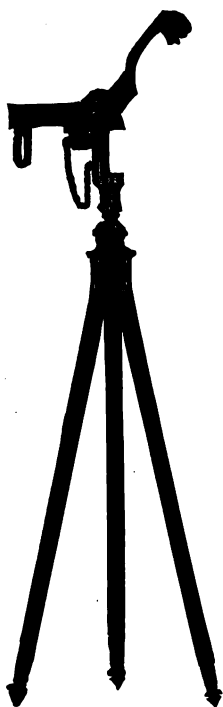
- 3596 Triangles. Iron, in three sizes, length of sides inside, $1\frac{1}{2}$, 2 and $2\frac{1}{2}$ inches.
 Each..... .05
 Dozen..... .50
- 3598 Triangles. Iron, pipe stem covered.
 Length of sides, inside.....inches $1\frac{1}{2}$ 2 $2\frac{1}{2}$ 3 4
 Each..... \$0.08 .08 .08 .10 .15
 Per dozen..... \$0.70 .70 .75 1.00 1.50
- 3600 Triangles. Iron, covered with flanged pipe stems.
 Length of sides inside.....inches 2 $2\frac{1}{2}$ $3\frac{1}{2}$
 Each..... \$0.12 .12 .12
 Per dozen..... \$1.20 1.20 1.20
- 3602 Triangles. On iron wire, covered with fused silica tubes.
 Length of sides, inside.....inches $1\frac{1}{2}$ 2 $2\frac{1}{2}$ 3 4
 Each..... \$0.15 .18 .20 .25 .30
- 3604 Triangles. All fused silica ware..... \$0.75 .75 .90 1.00 1.25
- 3606 Triangles, Hoskin's. Made from a special metallic alloy of very high melting point, remarkable resistance to oxidation and practically unaffected by ordinary action of acids; cost but one-sixteenth of platinum and last longer in service.
 Length of sides, inside.....inches $1\frac{1}{2}$ 2 $2\frac{1}{2}$ 3
 Each..... \$0.60 .70 .90 1.10
- 3608 Triangles. Pure nickel wire.
 Length of sides, inside.....ctm. 4 6 8
 Each..... \$0.20 .25 .30

Triangles, Platinum and Triangle Supports. See Platinum, page 336.

THE VERSCHOYLE POCKET TRANSIT IN ALUMINUM BODY



No. 3610



No. 3612

Weight of Instrument	9 oz.
Length	4½ in.
Width	3¾ in.
Depth	11-13 in.
Length of Sight Arm when opened .	5½ in.
Length of Needle	2¾ in.

This instrument combines the useful features of Abney Level, Prismatic Compass, and Clinometer. Designed by a mining engineer of practical experience in the use and possible application of the various forms of instruments intended for preliminary survey.

The distinguishing feature of the instrument is that, owing to its novel construction, only one observation is necessary to obtain both the magnetic bearing and the vertical angle of any distant point. It is also specially adapted for use in difficult positions, such as are always liable to occur in filling in the rougher details in a mining survey. For rapid topographical work and working in constrained positions, the fact that half the labor is saved should be of interest to those who have to use this class of instrument.

Another important point is that its efficiency is not determined by the length of the diameter of the compass, as is the case with the ordinary prismatic compass. With even a small instrument the same length of sight is obtained as would be obtained with a 6 or 7-inch prismatic compass.

As a thoroughly serviceable instrument it is worthy of special notice.

It is not a complicated delicate instrument liable to derangement or deterioration.

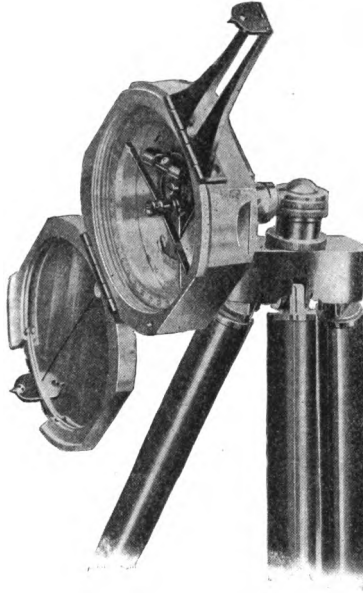
There are no reflectors or mirrors used other than the prism, which is protected and fastened in a secure manner.

3610 Verschoyle Transit for hand use, in sling leather case each \$35.00

3612 Same as 3610, but with Angle Piece and collapsible metal tripod, ball and socket fitting..... each 44.00

POCKET TRANSITS

THE BRUNTON



No. 3614

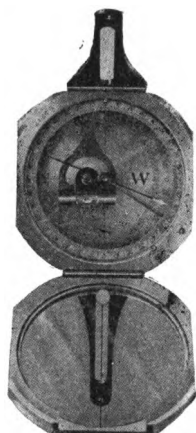
USED ON THE TRIPOD FOR VERTICAL ANGLES

While the transit is designed to be used principally as a hand instrument, it is sometimes desirable to utilize the advantages of a fixed support and an attachment is furnished which permits the operator to use for this purpose the light telescoping camera tripod which most engineers include in their traveling equipment. The above illustration shows the instrument mounted on such a tripod and tilted over so that it may be used either as a level or for taking vertical angles.

No.		Price
3614	Improved Type with Sight on Cover, and Slots for Attachment to Tripod Head, Compass Circle Numbered from 0 to 360 Clockwise	\$27.50
3616	Ball and Socket Tripod Head	2.50
3618	Tubular Extension Tripod	5.00

NOTE— Fully described in Bulletin B-40.

THE BRUNTON PATENT POCKET TRANSITS



OPERATOR'S VIEW



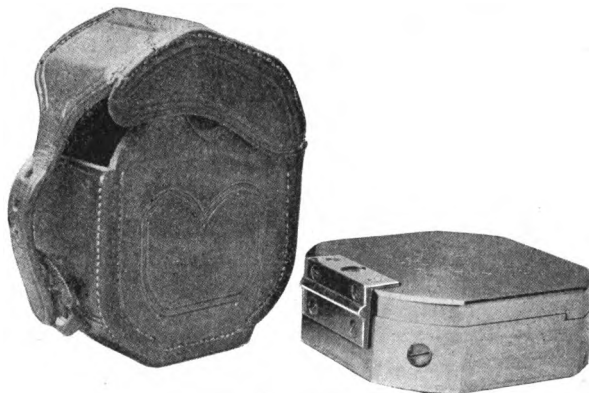
FOLDED FOR POCKET

No. 3620

3620 It is used by over 6000 civil and mining engineers, geologists and mine managers, who pronounce it the most convenient, compact and accurate instrument for preliminary surveying on the surface or underground. Price, standard type, without sight on cover or slots for attaching to tripod head and with compass circled numbered in quadrants (0 to 90) each way.

Price.....\$25.00

LEATHER CASES FOR BRUNTON PATENT POCKET TRANSITS

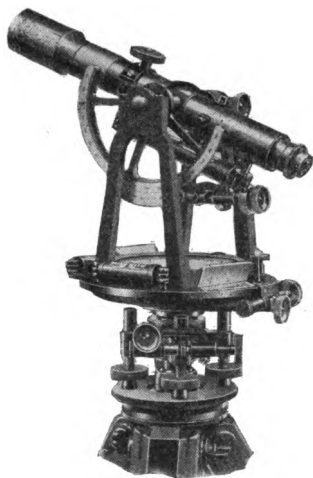


No. 3622

No.		Price
3622	Type [A. Leather case as shown above for carrying in pocket	\$1.50
3624	Type B. Same as Type A, with loop for carrying on belt.....	1.75
3626	Type C. Same as Type A, with sling strap.....	2.00
3628	Type D. Leather case for carrying instrument, tripod head, and tripod with sling strap	4.00

TRANSITS

AINSWORTH PRECISION TRANSITS



No. 3630

TYPE CC TRANSIT

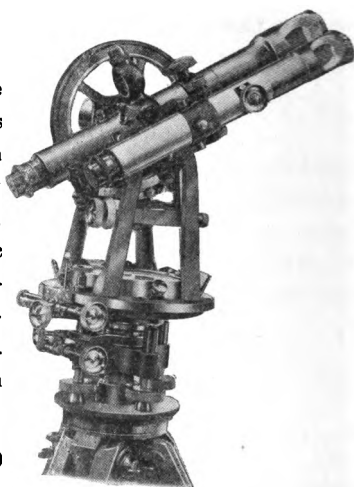
3630 This style has $4\frac{1}{2}$ -inch limb with verniers at 30 degrees with telescope, $4\frac{1}{2}$ -inch vertical arc, 8-inch 20-power telescope, 4-inch 30 seconds telescope level, stadia, axis clamp and tangent, 3-inch compass with magnetic variation plate actuated by pinion motion, all graduations excepting compass circle on solid silver. Non-cramping four-screw leveling head with shifting center. Weight net, $6\frac{1}{4}$ lbs. In carrying case with the usual accessories and extension tripod.

Price..... \$235.00

TYPE C MINING TRANSIT

3632 With Interchangeable Auxiliary Telescope and Counterweight, has $4\frac{1}{2}$ -inch limb with verniers at 30 degrees with telescope, $4\frac{1}{2}$ -inch vertical circle with aluminum guard, 8-inch 20-power main and auxiliary telescopes, 4-inch 30 seconds telescope level, stadia, axis clamp and tangent, 3-inch compass with magnetic variation plate actuated by pinion motion, all graduations excepting compass circle on solid silver. Non-cramping four-screw leveling head with shifting center. Net weight as shown, $7\frac{3}{4}$ lbs. In carrying case with the usual accessories and extension tripod.

Price, without reflectors or gradienter \$305.00

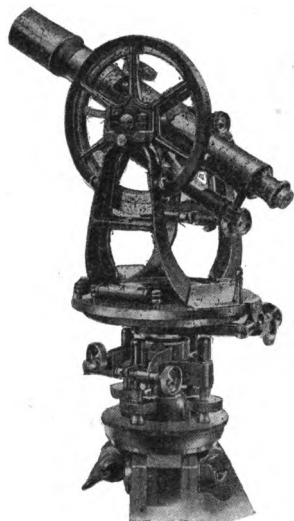


No. 3632

Either of the foregoing instruments furnished in the 6, $5\frac{1}{2}$, 5, and 4-inch limb sizes, and with any attachment as described in catalogue BX-40, which will be sent on application.

TRANSITS

AINSWORTH PRECISION THEODOLITES



No. 3634

TYPE BX THEODOLITE

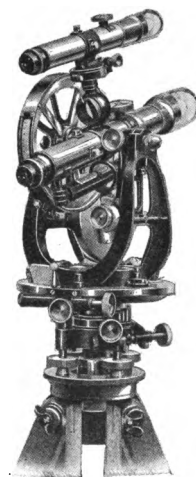
3634 Has 5-inch limb with verniers at 30 degrees with telescope, 5-inch vertical circle with aluminum guard, 10-inch 23-power telescope, 5-inch 30 seconds telescope level, stadia, axis clamp and tangent, U standard, 2½-inch compass with variation plate actuated by pinion motion, non-cramping four-screw leveling head with shifting center. Weight net, 10½ lbs. Packed in carrying case with the usual accessories and extension tripod.

Price..... \$260.00

TYPE CZ MINING THEODOLITE

3636 With Interchangeable Auxiliary Telescope and Counterweight, has 4½-inch limb, with verniers at 30 degrees with telescope, 4½-inch vertical circle with aluminum guard, 8-inch 20-power main and auxiliary telescopes, 4-inch 30 seconds telescope level, axis clamp and tangent, U standard, 2½-inch compass with variation plate actuated by pinion motion, non-cramping four-screw leveling head with shifting center. Net weight as shown, 8¼ lbs. Packed in carrying case with the usual accessories and extension tripod.

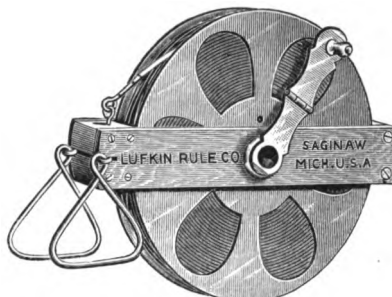
Price, without edge graduation and gradienter.. \$325.00



No. 3636

Either of the foregoing instruments furnished in the 6, 5½, 5, 4½ and 4-inch limb sizes, and with any attachment as described in catalogue BX-40, which will be sent on application.

SURVEYORS' FIELD SUPPLIES



No. 3638

3638 Steel Tapes. Graduated in feet, 10ths and 100ths.

	50 ft.	75 ft.	100 ft.	200 ft.
$\frac{1}{4}$ -inch, heavy, in steel case ..	\$5.25	8.75	10.50	.....
$\frac{1}{4}$ -inch, heavy, in leather case.	6.00	9.50	12.00	.....
$\frac{1}{4}$ -inch, heavy, in steel frame .	5.25	7.50	9.00	17.50
$\frac{3}{8}$ -inch, in steel frame.....	4.50	6.25	7.75	15.50
$\frac{1}{2}$ -inch, in steel frame.....	5.25	7.50	9.00	17.50

3640 Steel Chain Tapes. Graduated in feet, end feet in 10ths.

	100 ft.	300 ft.	500 ft.
$\frac{1}{4}$ -inch, heavy, with Reel and Handles..	\$7.50	14.00	21.50
$\frac{1}{8}$ -inch, heavy, with Reel and Handles..	7.50	14.00	21.50

3642 Arrows, No. 6 W. G. Steel.

10-inch, per set of 11.....	\$1.30
14-inch, per set of 11.....	1.50

3644 Plumb Bobs, Brass with Steel Point.

Size	oz.	8	12	16	24
Price.....each	\$1.75	2.10	2.50	3.25	

3646 Plumb Bobs, Mercury, with Steel Cases.

Size	oz.	6	12	16
Price.....each	\$1.80	2.40	3.00	

3648 Plummet Lamps, in Carrying Case with Strap, one only \$10.00

3650 Plummet Lamps, same as above, two only 18.00

3652 Stake Tacks, per 4 oz. Box 20c; per pound .60

3654 Spads, per Box of 5075

3656 Transit or Level Books, each, 65c; per doz..... 6.50

3658 Timber Scribes, each..... 1.25

3660 Lumber Crayons, all colors, per doz..... 1.20

3662 Level Rods, divided in feet, 10ths, and 100ths, with Vernier reading to 1000ths.

Price, 7 ft., extending out to 13 ft..... \$15.00

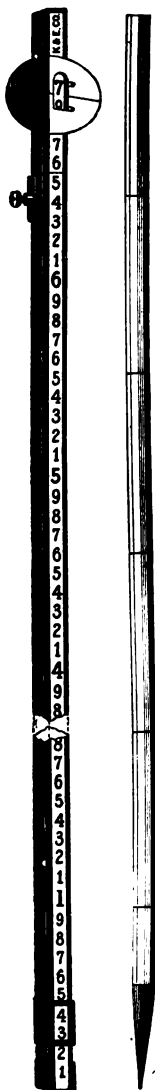
Price, 5 ft., extending out to 9 ft..... 13.50

Price, 3 ft., extending out to 5 ft..... 11.50

3664 Range Poles, each alternate foot painted white and red.

6 ft. 8 ft. 10 ft.

Round or Octagonal Wood, with Point. \$2.00 2.25 2.50

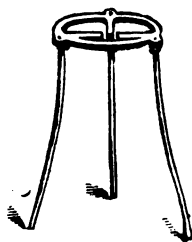
Tubular Steel, $\frac{1}{8}$ -inch diameter 2.75 3.00 3.50Round Steel, $\frac{1}{2}$ -inch diameter..... 2.75 3.00 3.50

No. 3662 No. 3664

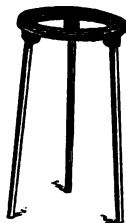
TRIPODS



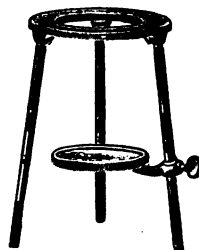
No. 3666



No. 3668



No. 3670



No. 3672

3666	Tripod. Of japanned iron, light pattern, 6 inches high, inside diameter of ring, $2\frac{1}{2}$ inches	\$0.25
3668	Tripod. Japanned iron, 8 inches high, inside diameter of ring, $3\frac{1}{2}$ inches, with three lugs .....	.30
3670	Tripod. Japanned iron, 8 inches high, inside diameter of ring, 3 inches....	.30
3672	Tripod. Same as above, but with adjustable lamp bracket .....	.75



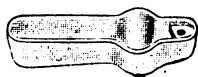
No. 3674



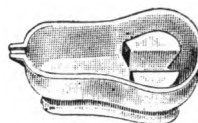
No. 3676

3674	Tripods. Japanned iron, 8 inches high:					
	Outside diam. of rings...inches	5	6	8	10	12
	Price.....each	\$0.30	.45	.60	.90	1.20
3676	Tripods. Japanned iron, 8 inches high:					
	Outside diam. of rings...inches	5	6	8	10	12
	Number of rings	2	3	4	5	6
	Price.....each	\$0.30	.40	.60	.90	1.00

TROUGHS AND TUBES

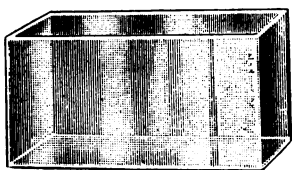


No. 3678

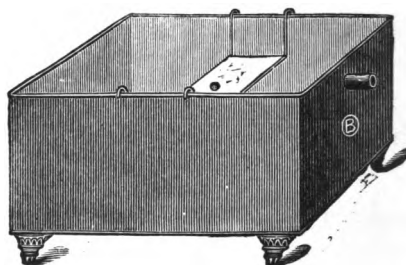


No. 3680

3678	Troughs, Mercury.	Porcelain, cross form, capacity, 6 pounds	.....each	\$0.90
3680	Troughs, Mercury.	Porcelain, oblong.	.....each	
	Capacity.....	lbs.	8	16
	Each.....		\$1.00	1.50



No. 3682



No. 3684

3682	Troughs, Glass.	With ground-off rims.				
	Length.....	inches	8	10	12	
	Width.....	inches	4	6	8	
	Height.....	inches	4	5	6	
	Each.....		\$1.50	2.00	3.00	
3684	Troughs, Pneumatic.	Japanned zinc, with sliding shelf and overflow.				
	Size.....	inches	5x7x10	5x9x12	6x11x15	8x12x18
	Each.....		\$1.25	1.50	1.75	2.00



No. 3686



No. 3688



No. 3690



No. 3692



No. 3694

Tubes, Arsenic. See Reduction Tubes, page 399, No. 3744.

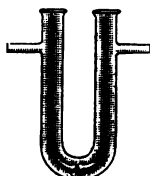
Tubes—Calcium Chloride.

	Length.....	inches	3	4	5	6	8
3686	Straight, one bulb	.....each	\$0.09	.10	.12	.15	.20
3688	Bent, one bulb	.....each	\$0.09	.10	.12	.15	.20
3690	Straight, two bulbs	.....each	\$0.10	.12	.15	.20	.25
3692	Bent, two bulbs	.....each	\$0.10	.12	.15	.20	.25
3694	Calcium Chloride.	With small reservoir to collect moisture in the bulb.					
	Length.....	inches	5	6	8		
	Each.....		\$0.25	.30	.35		

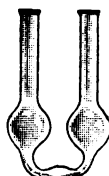
TUBES



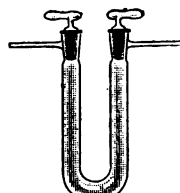
No. 3696



No. 3698

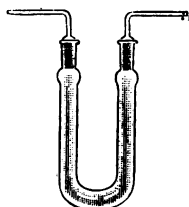


No. 3700

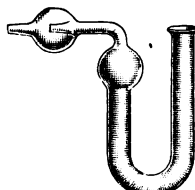


No. 3702

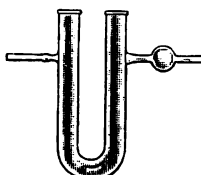
3696 Tubes, Calcium Chloride. Plain U form.								
Length.....inches	3	4	5	6	7	8	10	
Each.....	\$0.12	.14	.16	.20	.25	.30	.40	
3698 Tubes, Calcium Chloride. U form with side tubes.								
Length.....inches		4	5	6	8			
Each.....		\$0.15	.20	.25	.35			
3700 Tubes, Calcium Chloride. U shape with three bulbs.								
Length.....inches			5	6	8			
Each.....			\$0.30	.40	.50			
3702 Tubes, Calcium Chloride. With side tubes and perforated glass stoppers, admitting and shutting off the gas current.								
Length.....inches			4	5	6			
Each.....			\$0.90	1.00	1.25			



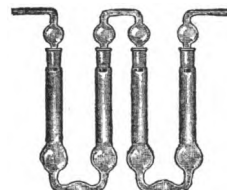
No. 3704



No. 3706



No. 3708



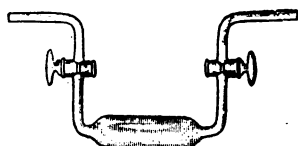
No. 3710

3704 Tubes, Calcium Chloride. With ground-in outlet tubes.				
Length.....inches		5	6	
Each.....		\$0.80	1.00	
3706 Tubes, Calcium Chloride, Marchand's.				
Length.....inches		4	5	6
Each.....		\$0.25	.30	.35
3708 Tubes, Calcium Chloride, Volhard's.				
Length.....inches		5	6	8
Each.....		\$0.30	.35	.40
3710 Tubes, Condensing, Woehler's. For ore determinations, with hollow ground glass stoppers.....per pair				\$3.00

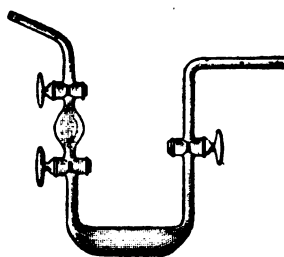
TUBES



No. 3712



No. 3714



No. 3718



No. 3720

3712 Tubes, Condensing. For sulphurous acid, with two stopcocks on vertical limbseach \$2.50

3714 Tubes, Condensing. For sulphurous acid, with two stopcocks on horizontal limbs.....each 2.50



No. 3716

3716 Tubes, Condensing, Liebig's. For sulphurous acid, with two bulbs and three stopcockseach 3.00

3718 Tubes, Condensing. For sulphurous acid, with three stopcocks and reservoireach 3.50

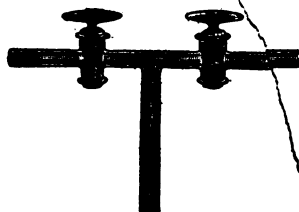
3720 Tubes, Condensing. For sulphurous acid, with one stopcock and exit tubeseach 1.50



No. 3722



Nos. 3724-3726



No. 3728

3722 Tubes, Condensing. W form, 6 inches higheach .50

3724 Tubes, Connecting. T or Y form. Of glass.

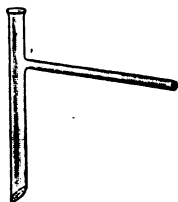
Bore.....inches	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	
Each.....	\$0.08	.10	.12	.15	.18	.25	.40

3726 Tubes, Connecting. T or Y form. Of brass.

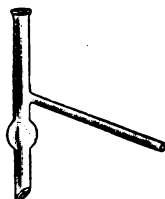
Bore.....inches	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	
Each.....	\$0.25	.25	.28	.30	.55

3728 Tubes, Connecting. T form. Of glass, with two stopcocks.....each \$2.25

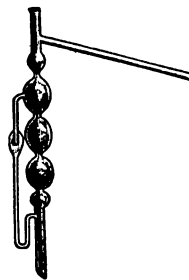
TUBES



No. 3730



No. 3732



No. 3734



No. 3736

3730	Tubes, Distilling. For fractional distillation, plain	\$0.25
3732	Tubes, Distilling. With one bulb .....	.30
3734	Tubes, Distilling, Glinsky's. With glass valves, 12-inch	1.50
3736	Tubes, Filtering, Gooch's. Of glass, for Gooch Crucibles, or Carbon Filters.	
	Diam.....mm. 20 25 28 31 34 38	
	Price.....each \$0.15 .20 .25 .30 .35 .40	

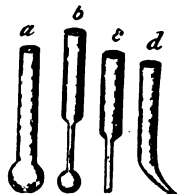
3738	Tubes, Ignition. Heavy test tube form, lead free glass.	
	Length.....inches 4 5 6 8	
	Price.....each \$0.60 .80 1.00 1.50	



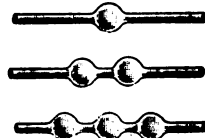
No. 3740



No. 3742



No. 3744



No. 3746

3740	Tubes, Ignition. Hard glass, straight.	
	Length.....inches 4 5 6 8	
	Price.....each \$0.08 .10 .12 .20	
3742	Tubes, Ignition. Hard glass, with bulb at end.	
	Length.....inches 4 5 6 8	
	Price.....each \$0.15 .18 .20 .30	
3744	Tubes, Reduction. For arsenic test. A, B, C, D.....dozen	\$0.30
3746	Tubes, Reduction. Hard Bohemian glass.	
	With bulbs .....Number 1 2 3	
	Price.....each \$0.20 .25 .30	

Tubes, Clay. See Clay Tubes, page 127, No. 1424.

Tubing, Glass. See under Glass, page 260, Nos. 2324-2338.

Tubing, Rubber. See under Rubber, page 351, Nos. 3148-3162.

Tubes, Test. See Test Tubes, page 379, Nos. 3498-3504.

URINE ANALYSIS APPARATUS



No. 3748



No. 3750

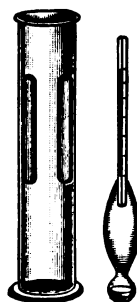


No. 3752

- 3748 Albumenometers, Esbach's. For the quantitative estimation of albumen in urine..... \$0.75
 Test solution for same, per pound, net..... .60
- 3750 Albumenometers, Esbach's. On glass foot, with pointed bottom for reading small quantities..... 1.00
- 3752 Albumoscopes. For testing for albumen with nitric acid. Very sensitive and rapid..... 1.00



No. 3754



No. 3756

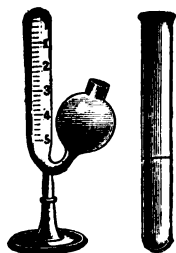
- 3754 Ammonia Tubes, Folin's. For the absorption of ammonia in urine analysis.. \$1.25
- 3756 Urinometers. Sp. G. scale 1000-1600, adapted to a temperature of 77° Fahr., and guaranteed accurate, in box with glass jar..... 1.00
- 3758 Urinometers. Same as above with accurate thermometer..... 2.00
- 3760 Urinometers. Small, for 10-15 cc. urine..... 1.00
- 3762 Urinometers. Set of three spindles (1000-1020), (1020 to 1040), (1040-1060), for exact estimations, per set..... 4.00



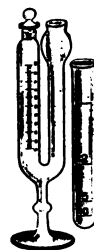
No. 3764

- 3764 Ureometers, Bartley's. For the rapid estimation of urea in urine without the aid of bromide, reagents required being solutions of potash bromide and chlorinated soda.
- Price, with directions, net..... \$1.00
- With Dr. Beebe's Clamp for same, as shown..... 1.50
- Solution Potassium Bromide, per lb., bottle included, net..... .50
- Solution Chlorinated Soda, per ¼-pt., bottle included, net..... .20

URINE ANALYSIS APPARATUS



No. 3766



No. 3768

- 3766 Saccharometer, Einhorn's.** Fermentation, for the quantitative estimation of sugar in urine by means of the action of yeast on the sugar present.

We recommend the use of two saccharometers at each test; one with normal urine, to which a small quantity of glucose has been added, to test the efficiency of the yeast used, the other for the urine to be examined.

Price, per set of two with 10-cc. graduated test tube..... \$1.50

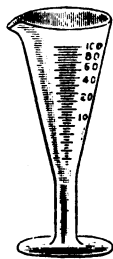
Price, each..... .75

Price of test tube, only..... .15

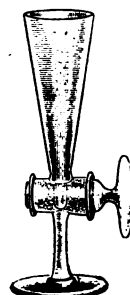
- 3768 Saccharometer, Lohnstein's.** For the exact determination of sugar in urine, patented, net..... 3.25



No. 3770



No. 3772



No. 3774

- 3770 Urine Sedimentation Glasses.** Conical, with lip.

Capacity.....cc.	60	125	175	250
Each.....	\$0.20	.30	.35	.40

- 3772 Urine Sedimentation Glasses.** Graduated, each..... .75

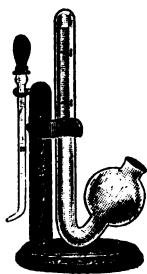
- 3774 Urine Sedimentation Glasses.** With receptacle in stopcock for collecting and removing the sediment..... 3.50

Centrifuges for Urine Analysis. See under Centrifuges, pages 121, 122.

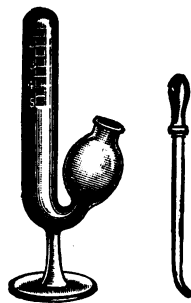
URINE ANALYSIS APPARATUS



No. 3776

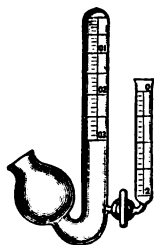


No. 3778

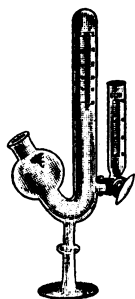


No. 3780

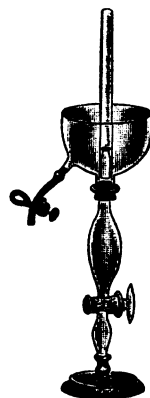
- 3776 Ureometers, Doremus'. For the rapid estimation of urea in urine, in box with one cc. pipette and full directions for use..... \$1.25
- Solution of sodic hydrate used with above, per lb., net..... .75
- Bromide, per ounce, net..... .25
- 3778 Ureometers. Support for above, made of polished wood, with clamp..... .75
- 3780 Ureometers, Doremus'. As above with glass foot..... 1.75



No. 3782



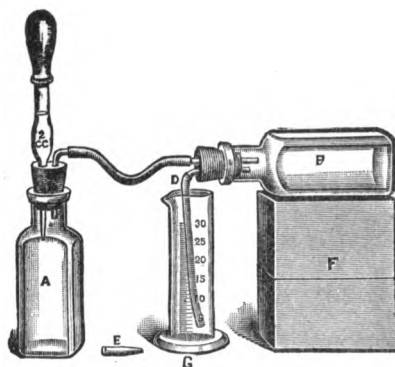
No. 3784



No. 3786

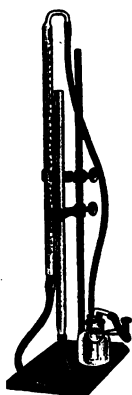
- 3782 Ureometers, Doremus'. Modified by Hinds..... 2.50
- 3784 Ureometers, Doremus'. Modified by Hinds with glass foot..... 3.00
- 3786 Ureometers, Huefner's. Improved, for the determination of urea..... 5.00

URINE ANALYSIS APPARATUS

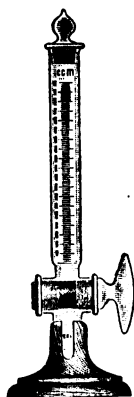


No. 3788

- 3788 Ureometers, Squibb's. For the approximate determination of urea in urine.
 Full directions and table furnished with each set.
 Price, complete, net..... \$3.00



No. 3790



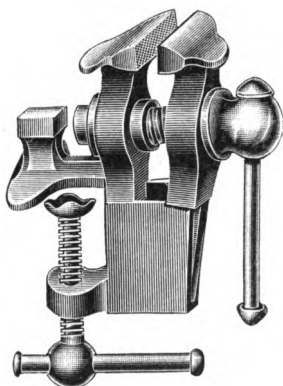
No. 3792



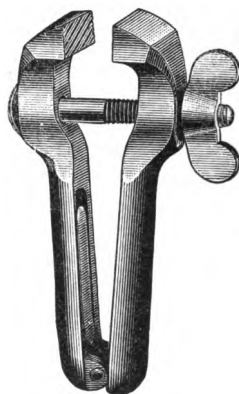
No. 3794

- 3790 Ureometer, Smith's. Is the most convenient, accurate and rapid instrument for the determination of urea. It is simple and efficient and is highly recommended by leading physicians who have it in constant use in their laboratories. The apparatus consists of a graduated tube, a leveling tube, bottle containing small tube vial, metal support fitted with two clamps, rubber connections and pinch-cock.
 Price of apparatus complete, net..... \$5.00
- 3792 Purinometers, Hall's. For estimating the amount of "Purin" nitrogen in urine, with directions for use..... 10.00
- 3794 Uricometers, Ruhemann's. For determining the amount of uric acid in urine, with directions for use..... 3.00

VISES



No. 3796



No. 3798

3796 Vises, Bench, with anvil, black, bright jaws.

Weight ...lbs.	1	1½	2	2½	3	3½	4	5	6
Each.....	\$0.60	.70	.90	1.00	1.25	1.50	1.75	2.25	2.75

3798 Vises, Hand, black, bright jaws.

Size.....inches	4	5	6
Each.....	\$0.60	.80	\$1.00

3800 Watch Glasses, best quality, well annealed, ground edges.

Diam...in.	1¼	1½	2	2½	2¾	3	3½	4	4½	5	6	7	8
Doz.....	\$0.20	.25	.25	.40	.50	.60	.80	1.00	1.20	1.50	2.00	3.00	4.00

Watch Glass Clamps. See Clamps, page 123, Nos. 1358-1360.

We are prepared to quote prices with duty free importation on all classes of goods for educational institutions.

Mule back transportation. If goods are to be packed for mule back, kindly specify so in order.

WATER BATHS



No. 3802



No. 3804

3802 Water Bath, heavy copper, tin-lined, with concentric rings and cover, handles and steam escape.

Diameter.....inches	4	5	6	8	10
Price.....each	\$1.00	1.20	1.50	2.25	4.50

3804 Water Bath, heavy copper, tin-lined, with Kekule's constant water level.

Diameter.....inches	4	5	6	8	10
Price.....each	\$1.50	1.75	2.00	2.75	5.00



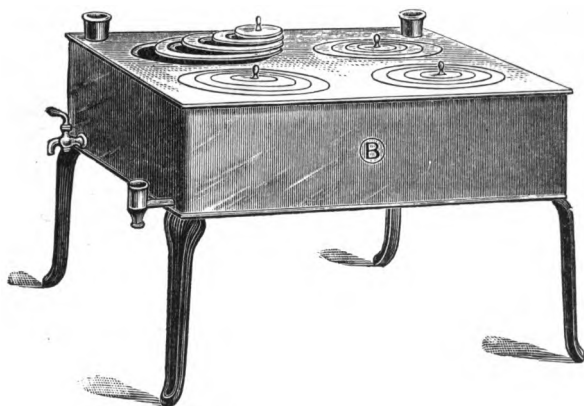
Nos. 3806-3808

3806 Water Bath, heavy copper, with three 6-inch and four 4-inch openings. All provided with concentric rings and cover in center; with stop-cock and constant water regulator.

Size, 23 x 14 x 5 inches each \$18.00

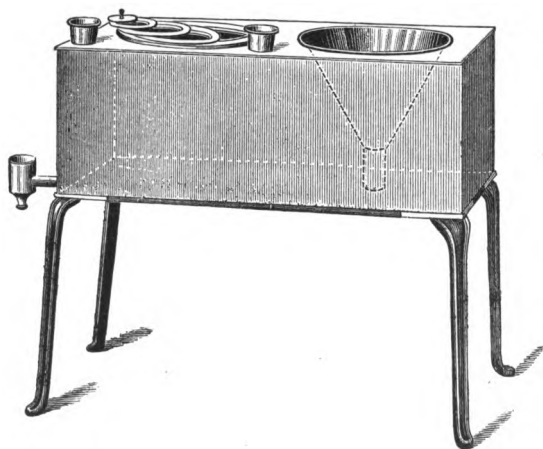
3808 Water Bath, same as above, but fitted with a coil, to be heated by steam each 22.50

WATER BATHS



Nos. 3810-3812

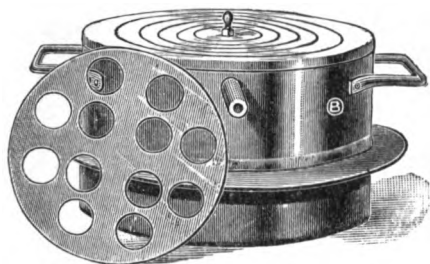
- | | | |
|------|---|---------|
| 3810 | Water Bath, of copper, with four 5-inch holes; size, 14 x 14 inches | \$12.00 |
| 3812 | Water Bath, same as above, but fitted with a coil, to be heated by steam, each..... | 15.00 |



No. 3814

- | | | |
|------|---|---------|
| 3814 | Water Bath, of copper, according to Griffin, for hot filtration and evaporation, size, 13 x 7 x 5 inches, tin-lined, with copper funnel, and one 5-inch hole with four concentric rings and cover. It is provided with a constant water level, an extra sheet iron bottom, and rests on four detachable legs..... | \$12.00 |
|------|---|---------|

WATER BATHS



No. 3816



No. 3818

3816 Water Bath. Of polished copper, tin-lined. The body of this bath is made of one piece (seamless), with concentric rings and cover, steam escape and extra plate perforated for test tubes.

Diameter.....inches	5	6	8
Rings.....inches	4	5	6
Each.....	\$2.00	2.50	4.00

3818 Water Bath. Cylindrical, of iron, porcelain-lined inside, with set of copper rings and cover.

Diameter.....inches	5	6	8
Each.....	\$1.50	2.00	3.00



Nos. 3820-3822

3820 Rings, Concentric. Of copper, tinned inside, for water baths, etc.

Number in set.....	3	4	5	6
O.D. of largest.....inches	4	5	6½	7¼
Per set.....	\$0.60	.80	1.00	1.25

3822 Rings, Concentric. Of porcelain, with cover.

Number in set.....	5	6	7
O. D. of largest.....inches	16	20½	25
Per set.....	\$1.00	1.50	2.00

DESERT WATER BAGS

Desert water bags are now regarded as indispensable by thousands of miners, prospectors, farmers, sheep and cattle rangemen, campers, motor-tourists, boatmen, vineyard and orchard hands, millmen, construction crews, hunters, surveyors, timbermen, R. R. section men, etc., etc., also for household use.

A specialty of recognized superior merit.

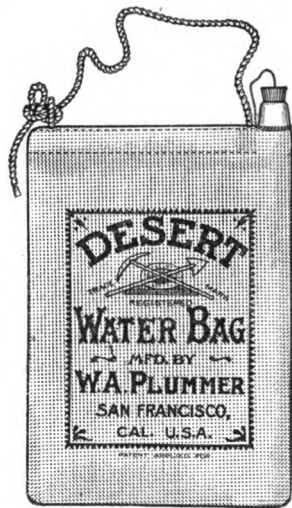
If you have used a desert water bag you know the exceptional worth of them, and would not deprive yourself of the luxury or satisfaction of enjoying a cool refreshing drink of good water, at any time and any place that your thirsty desire may demand it; but if you have not as yet used one, let us tell you about it. All desert bags are guaranteed.

They are durable, portable water coolers and containers that keep water cool and palatable for several days, even when exposed to a blazing mid-summer sun, without the use of (unhealthy) ice.

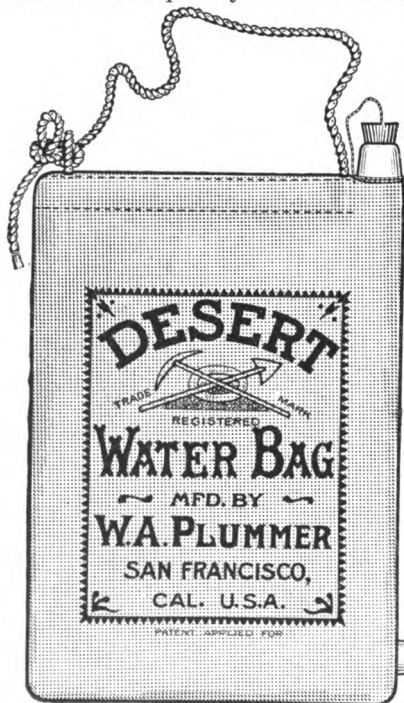
Cooled by the air—the warm properties are drawn to the outer surface by capillary attraction and evaporate.

No other water carrier has the same merits; they cannot be broken, will stand rough handling, are very handy when filled and can be folded when empty.

The material is pure (imported) flax woven into a durable fabric especially for Desert water bags.



No. 3824
REGULAR STYLE



No. 3826
FAUCET STYLE

The side and bottom seams are double-stitched and the seams are on the inside, entirely protected—outside seams are not safe or practicable.

At the top (inside) is a brace or spreader made of strong, flexible water-reed—cheaper constructed bags do not have this—it is very essential.

The sanitary, strong white-enameled vitreous spout (and the secure way it is bound in) is a decided improvement and unequaled.

This is the only brand that offers you a complete assortment—four sizes and two styles in the two larger sizes.

Capacity	Style	Size, Inches	Each
1 Gal.	Sporting	10 x 12	\$0.85
2½ Gal.	Regular	11½ x 17	1.25
3½ Gal.	Regular	12½ x 23½	1.50
5 Gal.	Regular	17½ x 23½	2.00
3½ Gal.	Faucet	12½ x 23½	2.00
5 Gal.	Faucet	17½ x 23½	2.50

See opposite page for new specials.

Directions (very simple) attached to every bag. Easy to fill, easy to handle, easy to cleanse (but seldom necessary), and they are worth to anybody many times the moderate price.

Hang one on the harness of a field team, on a wagon, or harvesting machine, on an automobile, riding or pack-saddle, on a fence, on a tree—anywhere in the open air.

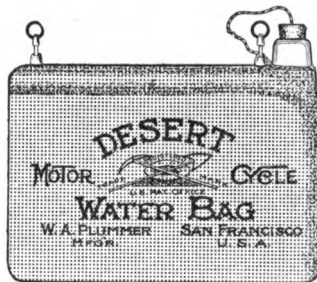
WATER BAGS AND FILTERS

AUTO-MOTOR WATER BAG



Nos. 3828-3832

MOTORCYCLE BAG



No. 3834

To make the line entirely complete and open up a new field, the makers have added these new styles and sizes.

WATER BAG FILTER AND COOLER
CLOSED OPEN

No. 3836

Capillary attraction and evaporation do the work. Water in these bags will become very cool and remain cold, especially when hanging on a machine exposed to the intense draught of air created by speed.

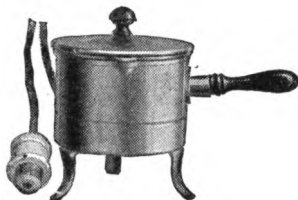
Auto-motor bags are usually hung at the left of front seat (outside). When empty can be folded; very convenient and there is no water container that can take their place; for radiator supply and drinking purposes.

"Desert" water bag filters and coolers save ice (no ice required); capacity of six gallons; easily cleansed.

3828	Auto-Motor Water Bags. 1-gallon size.	
	Each	\$1.00
3830	Auto-Motor Water Bags. 2½-gallon size.	
	Each	1.25
3832	Auto-Motor Water Bags. 5-gallon size.	
	Each	2.00
3834	"Desert" Motorcycle Bags. ½-gallon size.	
	Each .....	.90
3836	Water Bag Filters and Coolers. 6-gallon size.	
	each	5.00

Mule back transportation. If goods are to be packed for mule back, kindly specify so in ordering.

WATER HEATERS



No. 3838



No. 3840

INDISPENSABLE ELECTRICAL WATER HEATERS

- 3838 Made of seamless copper, nickel-plated and double tin-lined.
 Pint size, one heat, with six feet of cord and socket plug, each..... \$5.00
 Quart size, one heat, with six feet of cord and socket plug, each..... 6.75

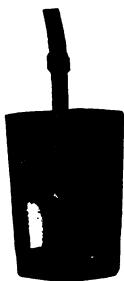
ELECTRIC IMMERSION HEATERS

- 3840 Cylindrical Spiral Type. These heaters are made of copper tubing bent into a cylindrical spiral as shown in the illustration. All of the immersion heaters listed below have three-heat regulation with the exception of the 500 and 750-watt size, which have but a single heat. With those having three-heat regulation, the minimum heat, one-quarter of the maximum, is sufficient to keep the water at the boiling point. Built in six sizes.

Maximum Watts	Time Required to Boil Water Starting at Ordinary Faucet Temp., Using Maximum Heat	
500	1 Qt.....	12 Min.
750	2 Qts.....	15 Min.
1000	1 Gal.....	5 Min.
1500	1 Gal.....	20 Min.
2000	2 Gals.....	25 Min.
2500	3 Gals.....	27 Min.
	2 Qts.....	20 Min.
	1 Gal.....	30 Min.
	2 Gals.....	45 Min.
	2 Gals.....	35 Min.
	3 Gals.....	35 Min.
	5 Gals.....	45 Min.

Prices and further information on application.

THE "QUICK-HOT" ELECTRIC LIQUID HEATER



No. 3842

The engraving shows the "Quick-Hot" in a glass of water before turning on the switch.

The "Quick-Hot" Electric Liquid Heater is a handy little device beautifully finished in nickel, six inches long, weighing only ten ounces.

It may be easily carried in the pocket.

When the plug is screwed into an ordinary lighting socket it is ready for use, using either direct or alternating current.

The current does not come in contact with the liquid.

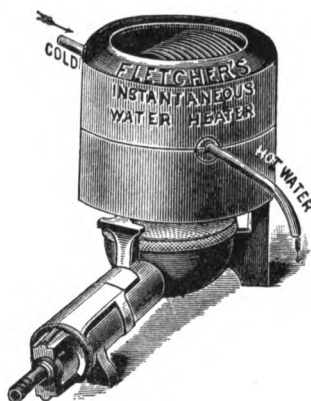
Liquids may be boiled in an ordinary drinking glass without breaking.

It is made of absolutely the best material that money can buy and is guaranteed against defects in material and workmanship for six months. Properly used in accordance with directions, it should last a life-time. As the heater is placed in the liquid, all heat generated must be utilized, hence it is very economical. Contrast the method

with the old way of heating from the outside. Its shape renders it easy to clean. It is as cleanly as a spoon.

- 3842 Price..... \$3.50

WATER HEATERS, ETC.

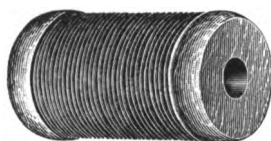


No. 3844

3844 Water Heater, Fletcher's, Instantaneous. This heater when connected with a water tap, gives hot water in three seconds after the gas is lighted, either boiling, hot, warm or cold, the water being pure and fit for cooking purposes.

In one minute it will deliver sufficient hot water for washing hands. It is simple, cheap not liable to get out of order or wear out. If frequently used for long periods in a confined room, the products of combustion should be carried away. For illuminating gas unless otherwise specified. No advance in price for altering to natural gas.

With burner, complete as shown \$6.00
 Water heater, without burner..... 4.00

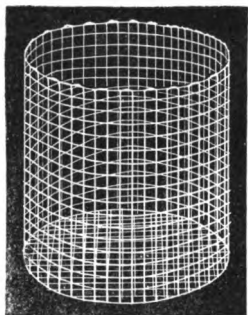


No. 3846

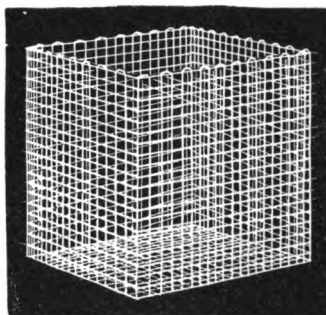
Whisk Brooms. See Brushes, page 102, Nos. 1064-1066.

3846 Wire, Copper.									
B. & S. Gauge No.	12	14	16	18	20	22	24		
Per lb. spool	\$0.40	.40	.40	.45	.50	.55	.60		
B. & S. Gauge No.	26	27	28	30	32	34			
Per lb. spool	\$0.65	.70	.75	.80	.90	1.00			
3848 Wire, Copper. Cotton covered No. 18 S. C. office or annunciator wire,									
per lb .....									.50
3850 Wire, German Silver. On ¼-lb. spools.									
B. & S. No.	16	18	20	22	24	26	28	30	
Spool.....	\$0.30	.30	.35	.40	.45	.50	.55	.60	
3852 Wire, Iron. Pure for standardizing.									
Per ounce bottle.....									.15
Wire, Platinum. See Platinum, page 336, No. 2994.									

WIRE



No. 3854



No. 3856

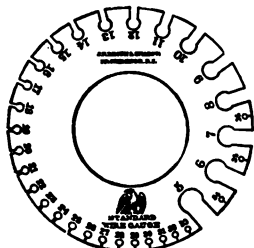
BASKETS FOR TEST TUBES, NICELY FINISHED, TINNED IRON WIRE

3854 Wire Baskets.

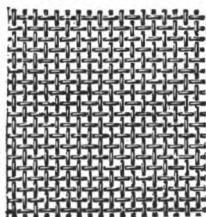
6 in. diameter, 6 in. high.....	\$0.60
9 in. diameter, 9 in. high.....	.75

3856 Wire Baskets.

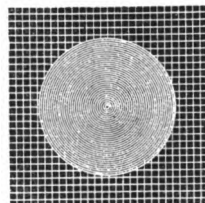
6 inches by 6 inches by 6 inches.....	.50
9 inches by 9 inches by 9 inches.....	.80
5 inches by 4 inches by 5½ inches high.....	.50
8½ inches by 5 inches by 5½ inches high.....	.75



No. 3858



No. 3860



No. 3868

3858 Wire Gauges, Brown & Sharpe..... \$3.00

3860 Wire Gauze, Brass.

Mesh.....	10	20	30	40	50	60	70
No. of wire	24	28	30	33	35	36	37
Per sq. foot....	\$0.50	.50	.60	.65	.65	.70	.80
Mesh.....	80	90	100	120	150	200	
No. of wire	38	39	40	42½	44½	47	
Per sq. foot....	\$1.00	1.25	1.45	1.85	3.00	6.00	

3862 Wire Gauze, Copper. For combustions, etc.

Mesh.....	20	40	60	80	100
Per sq. foot....	\$0.70	.80	.90	1.20	1.50

3864 Wire Gauze, Iron. Correct thickness for heating beakers, dishes, etc.

Size, sq. in.	4	5	6	8
Each.....	\$0.06	.08	.10	.20

3866 Wire Gauze, Brass.

Same as above.	\$0.10	.15	.20	.40
----------------	--------	-----	-----	-----

3868 Wire Gauze, Tinned Iron. With flat asbestos center.

Size, sq. in.	4	5	6
Each.....	\$0.12	.15	.20

WAY'S POCKET SMELTERS

FOR TESTING ORES



Nos. 3870-3876

The basis of the process is a small slotted tablet the size of an ordinary playing domino, which serves as fuel, furnace and crucible. In composition, the smelter tablet is carbon, with other reducing agents and fluxes in just the proper proportion to free the metals from their base associations and yet not fuse all into an alloy as in blow piping or fire methods. As a result, several different metals are often brought down and detected in one operation, impossible in any other method.

- 3870 Junior Outfit.** Composed of 1 box smelter tablets, 1 glass mortar and pestle, 1 iron mortar and pestle, 40 mesh screen, assayed ore samples, booklet of instructions, etc. Each..... **\$3.50**
- 3872 Senior Outfit.** Contains all of the above, and 1 2-ounce patented dropping bottle, with asbestos lined case, for nitric acid, magnifying glass, rubber cloth, etc. Each..... **\$5.00**
- 3874 Canvas and Leather Case.** With bateau, for above..... **1.25**
- 3876 Complete Outfit.** Especially designed for all-round field use. Contains all of above, with 1-ounce acid bottle for hydrochloric acid, 2 extra boxes smelter tablets, bateau, magnet, etc.....each **\$10.00**



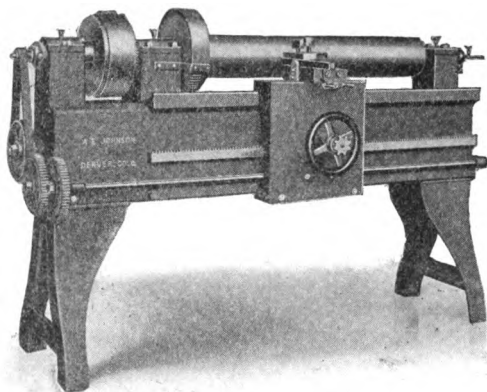
NO 3878

OFFICE OUTFIT

- 3878** Designed especially for office and laboratory use. Contained in a handsome imitation leather case, with nickel corners and fixtures. Contains all the articles included in the Field Outfit, with the addition of an extra glass mortar, holder for burning smelter tablets, and including four boxes of tablets (120 tests). A handsome addition to any office or laboratory. Each **\$15.00**
- 3879 Smelter Tablets** are sold separately to those with outfit, per box (30 tests).....**\$1.50**

JOHNSON RAPID ZINC SHAVING LATHES

(Patented)



No. 3880

The experience gained in this work, together with some of the problems connected with the rapid and economical production of the highest grade of zinc shavings for cyanide work has resulted in the production of a machine that most fully answers all requirements and is now in use in some of the largest mills in the country.

The development of this new and successful machine has been based on the experience of many months spent in the production of zinc shavings for the market.

The lathe, as shown in the engraving, is of the type in which the shavings are cut from commercial sheet zinc, taking sheets 36 inches in width, which are wound on an arbor under pressure, the shavings being cut by a side tool fed automatically.

This process is not new, and is sometimes used by adapting an ordinary engine lathe to the service, but at best this is makeshift, as compared with a properly designed machine made for this purpose especially. For instance, the tool post arrangements are not suitable for attaching the pressure winding device; also the heat generated by the cutting expands the arbor, and if not attended to is likely to destroy the center. Again, there being no provision in the construction of the ordinary lathe for a clear fall for the shavings from the arbor, they are apt to become tangled or wound again, thus causing frequent stoppage.

THE WATER COOLING DEVICE

This important feature is worked out in a very simple and effective manner, the arrangement requiring no stuffing boxes and no parts subject to wear, and having capacity to maintain the arbor in a perfectly cool condition. This prevents the zinc from becoming heated, so as to produce a poor quality of shavings.

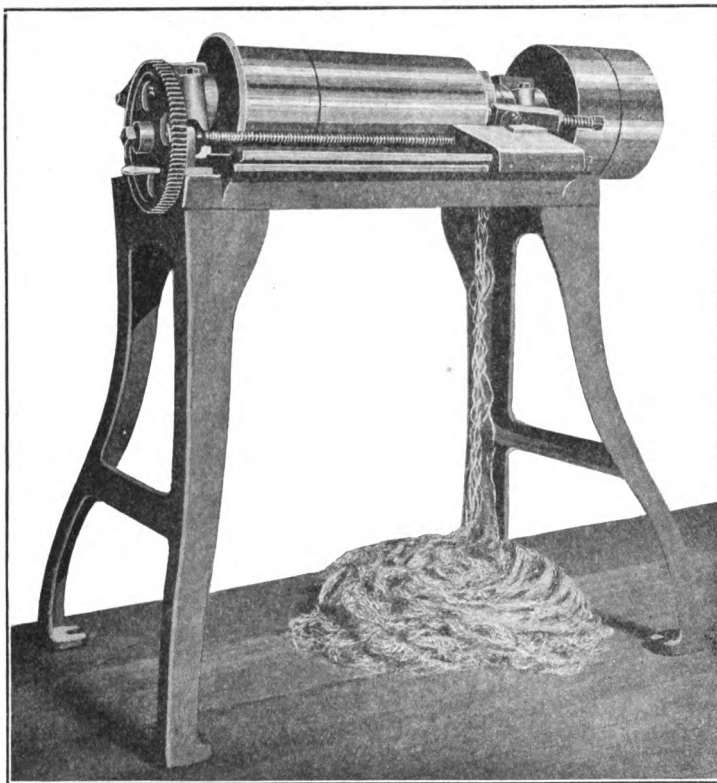
Among the advantages of this lathe we may note:

1. The use of plain commercial sheet zinc.
2. The exceedingly small percentage of waste.
3. The uniformity of product which can be maintained indefinitely.
4. The approved quality and strength of shavings produced, owing to the perfect cooling arrangements.
5. And last, but not least, the large capacity, the product per day of nine hours being from eight to nine hundred pounds of shavings cut to thickness of two and a half thousandths of an inch.

Prices and full information on application.

HAMPTON IMPROVED ZINC LATHES

No. 3



Nos. 3882-3884

The working parts of No. 3 Lathe are on the front part of the machine, enabling the cutting tool to be easily adjusted. The mandrel is 6 inches in diameter, cast with a hollow center, allowing a free circulation of air, preventing the zinc from overheating. The shavings, when cut, fall by gravity from the cutting tool to the floor. The machine is designed to cut three (3) thicknesses of shavings, 500, 800 and 1600 to the inch. This is accomplished by adjusting the eccentric so that the pawl will take 1, 2 or 3 notches in the ratchet wheel.

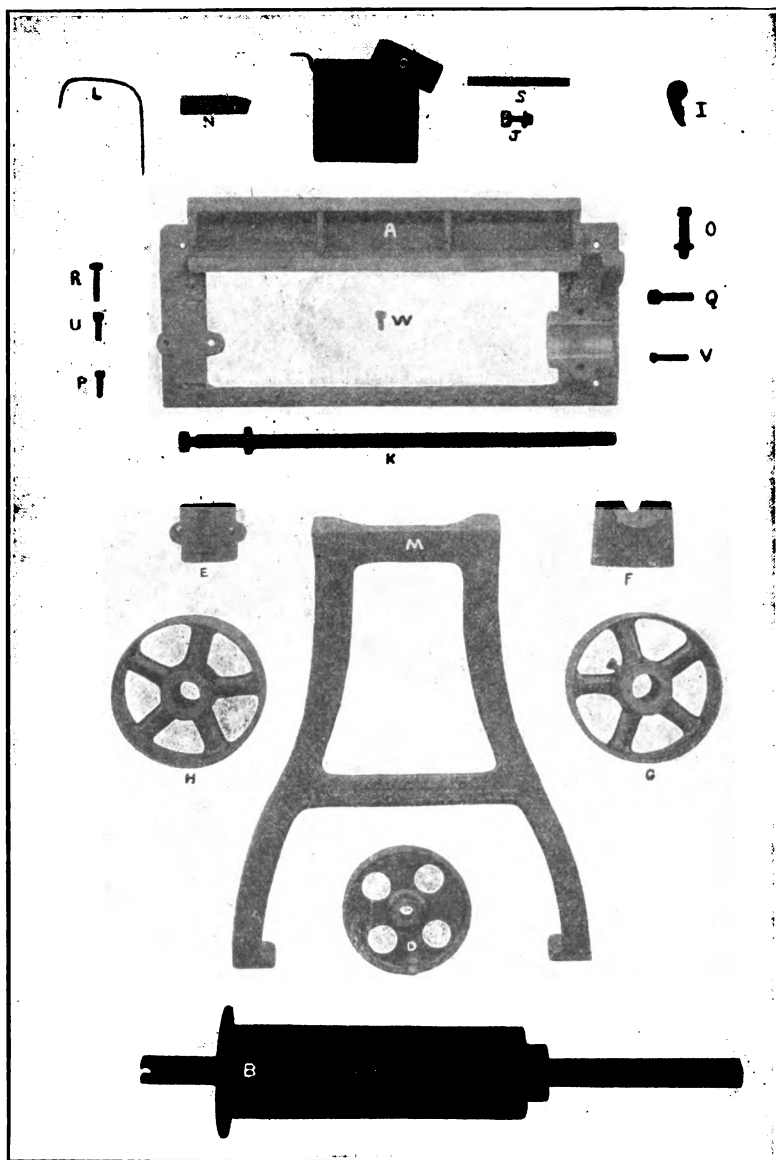
Capacity, 150 pounds shavings, 8 hours. Height to center of mandrel, 36 inches. Speed, 120 revolutions per minute. Size of pulleys, 10 x 4-inch face. Size of zinc sheets, 18 x 84 inches. Floor space, 25 x 45 inches.

No.	Lathe No.	Shipping Weight	Price Each
3882	3	475 pounds	\$100.00
3884	4	375 pounds	90.00

Lathe No. 4 is the same as No. 3, except it is furnished for bench use, without legs.

HAMPTON IMPROVED ZINC LATHES

EXTRA PARTS



Order by number, and do not confuse Nos. 3 and 4 lathes with old style Nos. 1 and 2. Prices for extra parts on following page.

HAMPTON IMPROVED ZINC LATHES**PRICE LIST OF EXTRA PARTS**

Letter of Part	Name	Actual Weight Pounds	List Price
A	Bedplate.....	97	\$17.00
B	Mandril.....	88	31.50
C	Toolholder Slide.....	18	7.50
D	Ratchet.....	6 $\frac{1}{2}$	5.00
E	Regular Cap.....	5 $\frac{1}{2}$	2.00
F	Under Pillow Block (goes with A).....	12 $\frac{1}{2}$	2.50
G	Pulley with Set Screw.....	21 $\frac{1}{2}$	7.50
H	Pulley, loose.....	21 $\frac{1}{2}$	7.50
I	Pawl.....	1 $\frac{1}{2}$	1.50
J	Eccentric.....	1 $\frac{1}{4}$	2.00
K	Feed Screw.....	6 $\frac{1}{2}$	6.00
L	Spring Safety Trip.....	1 $\frac{1}{4}$	2.00
M	Leg Casting (one).....	49 $\frac{1}{2}$	5.00
N	Cutting Tool.....	1	2.00
O	Cutting Tool Feed Screw.....		2.00
P	Cutting Tool Set Screw.....		.50
Q	Cap Screw.....		.50
R	Bed Plate Screw.....		.50
S	Tool Holder Gib.....		1.00
T	Tool Holder Gib Screws (3).....		.50
U	Under Pillow Block Screw.....		.50
V	Adjustment Set Screw.....		.50
W	Spring Trip Set Screw.....		.50

DIRECTIONS FOR INSTALLING AND OPERATING THE HAMPTON IMPROVED ZINC LATHE

Upon receipt of Lathe, unpack and attach legs (which in case of No. 3 Lathe are shipped in separate package) to the bed plate of Lathe by inserting 4 draw bolts through the legs and into the bed plate.

Fasten legs to floor, which should be rigid and as free from vibration as possible.

Lathe should be set so belt will pull from side, and a good length of belt should be used.

The Lathe should be elevated so the shavings will have a vertical drop of about 6 feet; in other words, set the Lathe on the second floor, or platform, and cut a hole for shavings to drop to receptacle below. This weight of shavings will prevent them from winding around the mandril.

After the Lathe is in position and ready to run, thoroughly oil and allow same to run for a short time before winding on supply of zinc.

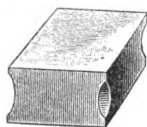
When Lathe is in good running order and well cleaned, wrap a piece of heavy paper around the mandril and insert the first sheet of zinc in slot, winding it tightly, and just before the end of sheet is reached insert another sheet under the end of the first, continuing this until 8 or 9 sheets have been placed on the mandril. Hold zinc in place by binding with two (2) pieces of wire.

The machine is now ready to operate, and care should be taken not to allow the cutting tool to come in contact with the mandril. If the lathe chatters, the power should at once be turned off and cutting tool re-ground. One or more tools should be ground and kept ready to take the place of a dull one.

After loading the mandril, be sure and set the safety spring at the left-hand side of machine so the trip will throw the pawl out of the ratchet wheel and prevent the tool from cutting into the flange at end of mandril.

Be careful and grind the cutting tools on same angles as those furnished with machine. Do not let your machinist experiment with the Lathe, with a view of improving same, as we have already done this; and as zinc is very hard to turn into shavings, we believe the machine, as now constructed, is as good as a zinc lathe can be made.

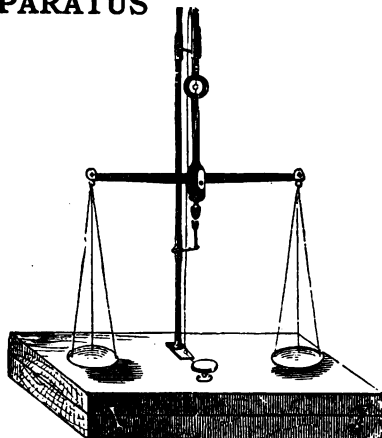
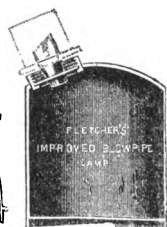
BLOW PIPE APPARATUS



No. 1



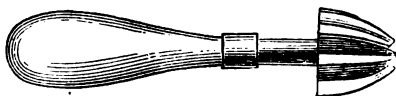
No. 13



No. 2



No. 4

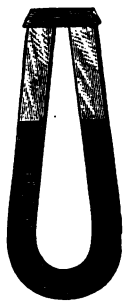


No. 21

3885 Blow Pipe Apparatus. According to Prof. Plattner. For qualitative and quantitative blow pipe analysis, made after samples taken from the original "Freiberg" set.

1	Anvil. Small, best polished steel No. 1	\$ 0.75
2	Balance, Plattner's. In polished case, with set of weights ...	22.50
3	Beakers. Lipped, 000 to 0 .....	.25
4	Blow Pipe, Black's. Conical form with brass tip .....	.20
5	Blow Pipe. Jewelers' form, plain .....	.15
6	Blow Pipe. Brass, jewelers' form, with bulb .....	.25
7	Blow Pipe, Berzelius'. Of brass, with platinum plate	1.50
9	Blow Pipe, Plattner's. Nickel-plated, with movable platinum tip and hard rubber mouthpiece	3.00
11	Blow Pipe Lamp, Plattner's. Nickel-plated	3.00
12	Blow Pipe Lamp, Plattner's. Nickel-plated, with patent swivel	4.00
13	Blow Pipe Lamp, Fletcher's. Polished brass .....	.75
14	Blow Pipe Lamp, Fletcher's. Brass, nickel-plated	1.00
15	Blow Pipe Lamp. Tin, for tallow .....	.30
16	Burners, Bunsen's. With tip and tube for blow piping .....	.85
17	Button Brush .....	.40
18	Capsules. Of porcelain .....	.20
19	Carbon Blocks. Molded, 4 in. diameter .....	.25
20	Carbon Cylinders. Molded, 3 x 1½ in .....	.20
21	Charcoal Borer. Club shape, large .....	.75
22	Charcoal Borer. Four-cornered, small .....	.50
23	Charcoal Borer. With spatula .....	.50
24	Charcoal Capsules	doz. .20
25	Charcoal Crucibles	doz. .20
26	Charcoal Holder. With platinum wire and shield	2.25
27	Charcoal Saw .....	.35

BLOW PIPE APPARATUS



No. 63



No. 78



No. 36



No. 57



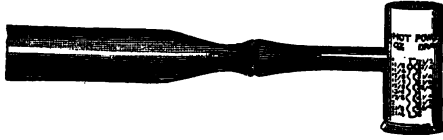
No. 53



No. 72

No.			
28	Charcoal Squares.....	dozen	\$1.00
29	Charcoal Square Covers.....	dozen	.40
30	Charcoals, Natural.....	dozen	.50
31	Charcoals, Artificial.....	dozen	.50
32	Clay Capsules.....	dozen	.20
33	Clay Crucibles.....	dozen	.20
34	Clay Cylinders.....		.25
35	Cold Chisels.....		.25
36	Cupel Holder. With two molds and one stamp.....		1.50
37	Dishes, of porcelain. Three in set.....	set	.25
38	Dropping Bottles.....		.30
39	Dropping Tubes.....		.05
40	Files. Round and triangular, with handles.....		.30
41	Forceps. See under Forceps in index.		
48	Forms of boxwood. For paper cylinders.....		.15
49	Funnel. Of glass. Small set of three.....		.30
51	Funnel. Of tin, japanned.....		.25
53	Hammers, Plattner's. Polished wire handle.....		.60
54	Hardness Scales.....		2.00
55	Holder. For chimney and funnel.....		1.50
56	Holder. For evaporating dish, with triangle.....		2.00
57	Holder. For platinum wire.....		.50
58	Holder. Same as 57, with six wires.....		1.25
59	Ivory Spoon.....		.25
60	Knife.....		.25
61	Lamp. For alcohol, glass.....		.50
62	Lamp. For alcohol, brass.....		.50
63	Magnet. Horseshoe.....		.25
64	Magnet. Straight. With chisel edge.....		.35
65	Magnifiers. See in index.		
70	Matrasses, with bulb.....	dozen	.30
72	Matrass Holder.....		.30
73	Mixing Capsule. Brass.....		.20
74	Mixing Capsule. Brass, nickel-plated.....		.30
75	Mixing Capsule. German silver.....		.35
76	Mixing Capsule. Horn.....		.15
77	Mixing Spatula. Steel.....		.25
78	Mortar. Agate, with pestle.....		1.50

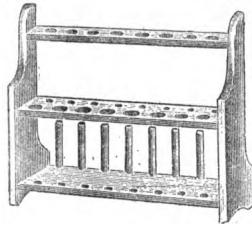
BLOW PIPE APPARATUS



No. 103



No. 81



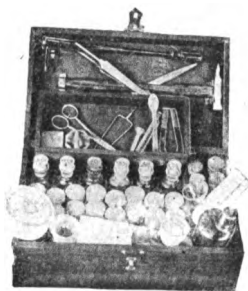
No. 107



No. 115

No.			
79	Mortars, Plattner's Diamond.	Steel, small.	\$3.50
80	Mortars, Plattner's Diamond.	Steel, large.	5.50
81	Mortars, Leed's form.	Steel.	2.00
82	Molds.	For charcoal square and covers.	4.50
83	Molds.	For charcoal capsules.	.70
84	Molds.	For charcoal crucibles.	.50
85	Molds.	Of brass, for clay crucibles.	4.00
86	Molds.	Of boxwood, for clay crucibles.	1.25
87	Molds.	Of boxwood, for clay capsules.	.75
88	Nippers.	Flat-nose pliers.	.40
89	Platinum Foil.		market price
90	Platinum Wire.		market price
91	Platinum Crucible.		market price
92	Platinum Spoon.		market price
93	Platinum Tip.	For blow pipe.	market price
94	Pliers, for Assay Buttons.	Straight and bent.	.40
95	Scale, Plattner's.	Of ivory, for silver beads.	3.00
97	Scissors.	For lamp.	.50
98	Shears.	For cutting metal.	1.00
99	Silver Foil, Chem. Pure.		ounce 1.25
100	Soda Papers.		box .20
101	Stirrers.	Of glass.	dozen .25
102	Streak Plate.		.20
103	Test Lead Measure.		.25
104	Test Lead Sieve.		.50
105	Test Tubes.		dozen .25
106	Test Tube Holder.		.15
107	Test Tube Support.		.45
108	Tin Box.	Japanned. For charcoal squares.	.75
109	Tin Box.	Japanned. For capsules and crucibles.	.75
111	Tin Trays.	Japanned. For charcoal.	.45
112	Tin Trays.	Japanned. For dirt.	.35
113	Tubes.	Open at both ends, hard glass.	dozen .30
114	Tubes.	For arsenic reduction.	.10
115	Wash Bottle.		.75
116	Watch Glass, 2-inch.		dozen .25
117	Watch Glass Clip.		.25
118	Wicks.	For lamp.	bundle .10

BLOW PIPE APPARATUS IN SETS



Nos. 3386-3888

3886 Braun's Qualitative Blow Pipe Outfit. This set is packed in varnished wood box, 12 inches long, 7 inches wide, 5 inches deep, outside measurements. Forty-eight different articles of apparatus and chemicals packed in bottles, boxes and recesses, neatly labeled and ready for use.

- | | | |
|----------------------------|-----------------------|-------------------------|
| 1. Anvil, Polished Steel | 17. Scissors | 33. Soda Carbonate |
| 2. Brass Blowpipe | 18. Horn Spoon | 34. Soda Nitrate |
| 3. Agate Mortar | 19. Test Lead Measure | 35. Alcohol |
| 4. Alcohol Lamp | 20. 3 Open Tubes | 36. Ammonia Hydroxide |
| 5. Beaker | 21. 3 Closed Tubes | 37. Hydrochloric Acid |
| 6. Clay Cylinder | 22. Magnifier, 1-inch | 38. Copper Oxide |
| 7. Charcoal Stick | 23. Blue Litmus Paper | 39. Iron Oxide |
| 8. Evaporating Dish | 24. Red Litmus Paper | 40. Lead Oxide |
| 9. 3 Porcelain Crucibles | 25. Turmeric Paper | 41. Manganese Oxide |
| 10. Forceps, 5-inch | 26. Brazil Wood Paper | 42. Mercury Oxide |
| 11. Forceps, Platinum Tip | 27. Borax Glass | 43. Potash Bisulphate |
| 12. Hammer | 28. Borax Powder | 44. Test Lead |
| 13. Horseshoe Magnet | 29. Bone Ash | 45. Tin Oxide |
| 14. Pipette | 30. Antimony Oxide | 46. Cobalt Nitrate Sol. |
| 15. Platinum Wire Holder | 31. Arsenous Acid | 47. Nitric Acid |
| 16. 3 pieces Platinum Wire | 32. Salt Phosphorous | 48. Sulphuric Acid |

Price.....\$15.00

3888 Braun's Qualitative Blow Pipe Outfit. Similar to above but measuring approximately 12 inches long, 7 inches wide, and 6½ inches deep, conveniently arranged with additional tray containing the following minerals in screw cap vials neatly labeled:

- | | | | | |
|-------------------|----------------|------------------|------------------|------------------|
| 1. Graphite | 11. Chromite | 21. Calcite | 31. Orthoclase | 41. Chrysolite |
| 2. Sulphur | 12. Limonite | 22. Apatite | 32. Witherite | 42. Scapolite |
| 3. Stibnite | 13. Siderite | 23. Gypsum | 33. Albite | 43. Tourmaline |
| 4. Chalcocopyrite | 14. Pyrolusite | 24. Dolomite | 34. Spodumene | 44. Cyanite |
| 5. Galenite | 15. Rhodonite | 25. Barite | 35. Hornblende | 45. Pyrophyllite |
| 6. Rutile | 16. Sphalerite | 26. Magnesite | 36. Wollastonite | 46. Talc |
| 7. Pyrrhotite | 17. Willemite | 27. Celestite | 37. Beryl | 47. Datolite |
| 8. Pyrite | 18. Corundum | 28. Strontianite | 38. Garnet | 48. Prehnite |
| 9. Hematite | 19. Cryolite | 29. Halite | 39. Mica | 49. Pectolite |
| 10. Magnetite | 20. Fluorite | 30. Quartz | 40. Lepidolite | 50. Stilbite |

Price.....\$18.00

LABORATORY FURNITURE

DRAWING TABLES



No. 3890

The top measures 55x35x1 $\frac{1}{4}$ inches and is made from selected bass wood or pine.
 The drawer measures 31x19x2 $\frac{1}{2}$ inches deep inside. Eagle flat key lock on drawer.

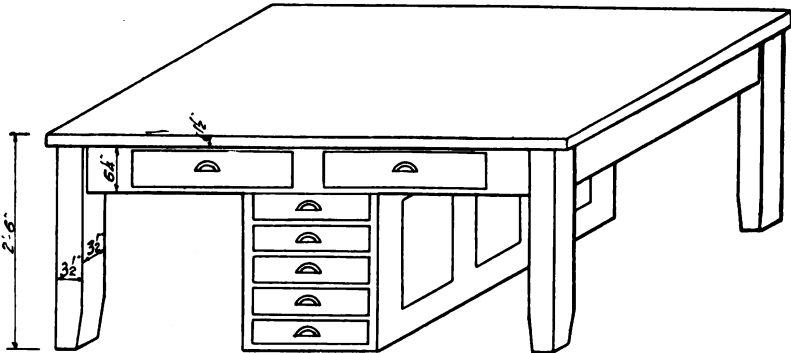
The tilting arrangement is simple and very firm in any position.

The lower part is made from maple or elm and varnished.

The users of these drawing tables have found them very satisfactory, and in consequence has proved to be a good seller.

Price..... \$20.00

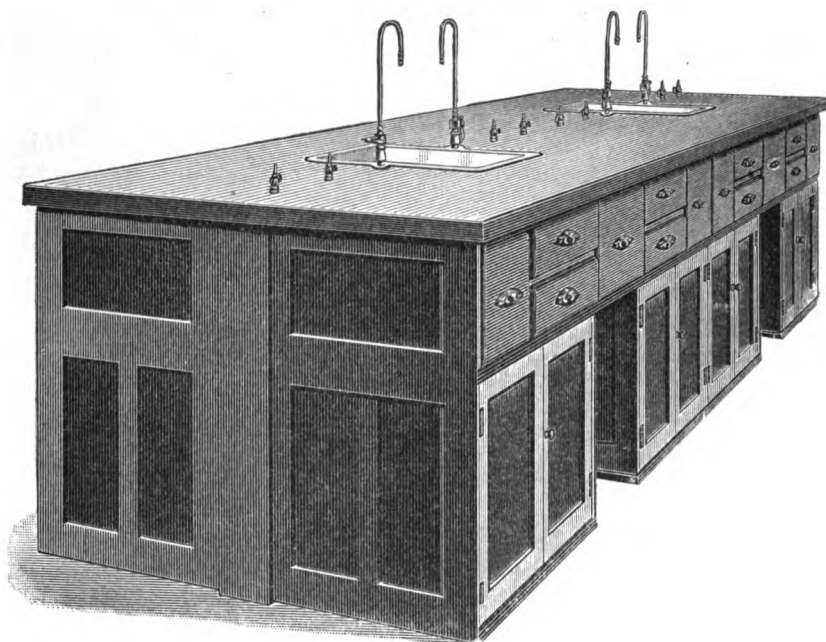
BIOLOGICAL LABORATORY TABLE



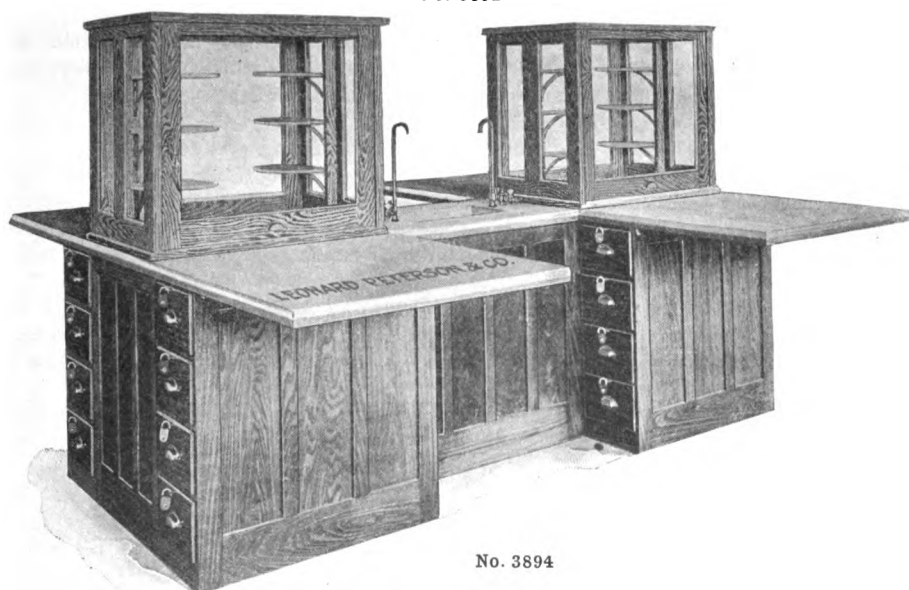
No. 3891

Prices, full information and specifications on application.

STUDENTS LABORATORY TABLES



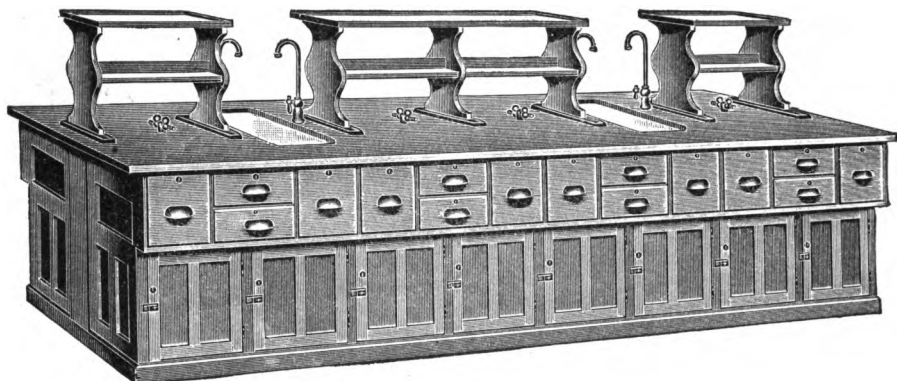
No. 3892



No. 3894

Send us your specifications and we will quote on them. We can supply anything you require in this line. Tables made to order.

STUDENTS CHEMICAL LABORATORY TABLES



No. 3896

Chemical laboratory table, "A" arranged to accommodate 16 students working in sections of 8. This design and arrangement has proved to be the most suitable for students chemical laboratories.

SPECIFICATION

Size—Twelve feet long, 4 feet wide, 3 feet high.

Top—Alberene Stone, 12x4 feet x1¼ inches thick, or 1¾-inch thick wood top.

Sinks—Two Alberene Stone Sinks, 16x14x6 inches deep, inside measure. The Alberene Stone is guaranteed to be absolutely acid-proof.

Overflows—Two standing removable overflows, two inches high.

Water—Four nickel-plated pantry water cocks threaded for Chapman Aspirators. We also furnish, when so ordered, detachable nipples for hose of other make of Aspirators that may be used. Name of aspirators should be stated when ordering.

Gas—Four two-way gas hose cocks, 8 outlets.

Waste—Two extra heavy lead traps. All plumbing complete to floor line.

Reagent Shelves—As per illustration or full length of table, treated acid-proof.

Locks—Forty-eight master keyed locks in sets of 3 locks. This arrangement gives each student one large drawer 16½x8¾x10¼ inches deep, inside measure; and one small drawer 16½x11x4¼ inches deep, inside measure; one cupboard with shelf in center 16½x14x19 inches high.

Panels—All panels 3-ply veneered.

Doors—Five-ply veneered, guaranteed not to warp, swell or shrink. The advantage of using a 5-ply veneered door is that the surface is smooth, giving no chance for dust to accumulate, and easily kept clean.

Drawers—Lap front in order to exclude dust as far as possible.

Back—The back of cupboards removable. The back slide in grooves, therefore, can easily be withdrawn from ends of table in order to have free access to plumbing.

Finish—All exposed parts given one coat of antique filler and two coats of varnish, or any other shade, when so ordered.

Weight—Of stone top, sinks and plumbing 1,300 pounds: Weight of table below top, 700 pounds. Total weight of table 2,000 pounds.

3896 Price..... \$200.00

LABORATORY EQUIPMENT

Estimated for Twelve Students

SCALES, BALANCES AND WEIGHTS

- 482 1 Union Scale with two Platforms, scoop capacity from $\frac{1}{2}$ oz. to 30 lbs. Platform capacity up to 240 lbs.; size of platform, $10\frac{1}{2} \times 13\frac{1}{2}$ inches.
- 502 1 Moisture Scale, beam graduated in percentages and pounds, very accurate.
- 370 3 Scale Covers of Rubber Sheetting, dustproof, made to fit balances.
- 576 3 Sets (Gramme Weights), 50 grammes to 1 milligramme, and three riders.
- 372 3 Becker's No. 8A Short Beam Analytical Balances (patented), for a charge up to 200 grammes in each pan and sensible to 1-20 milligramme. In French polished mahogany and glass case, front sliding frame counterpoised, with glass top to admit more light to rider. All parts of the balance are mounted and fastened on plate glass $\frac{1}{8}$ inch thick so that nothing can get out of order through warping of the wood. All bearings are agate planes with agate knife edges, and the beam is graduated in 1-10 milligramme and in such a manner that the rider can be placed on the centre of the beam and used from the O point to either end of the beam. Provided with new improved arrangement for arrest of pans and beam, riders, apparatus for specific gravity and for weighing tubes. Pans $2\frac{3}{8}$ inches in diameter; width of pan support 4 inches, can be made wider if desired.
- 350 3 Ainsworth Analytical Balances, Type Q, 7-inch beam; sensibility, 1-20 milligramme; capacity, 200 grammes, hard rolled nickeled aluminum beam, agate edges and bearings, double rider, skeleton hangers, two level vials in base, plate glass covering entire base, all metal work gold-plated except center bearings and drop levers, polished mahogany case, dimensions, 20x20x10 inches; weight, packed, 60 pounds.

PORCELAIN WARE

- 1276 18 Casseroles, German porcelain; capacity, 4 oz.
- 1276 18 Casseroles, German porcelain; capacity, 8 oz.
- 1426 18 Color Test Plates, with 12 cavities; size, $3\frac{1}{4} \times 4\frac{1}{4}$ inches.
- 1522 54 Crucibles, Royal Berlin Porcelain, with covers, glazed inside and outside, No. 00; size, $1\frac{1}{4}$ inch; capacity, $\frac{1}{2}$ oz.
- 1522 18 Crucibles, Royal Berlin Porcelain, with covers, glazed inside and outside, No. 2; size 2 inch; capacity, $1\frac{3}{4}$ oz.
- 1708 18 Evaporating Dishes, German Porcelain, glazed inside, with heavy rim, No. 9; capacity, 12 oz.
- 1538 18 Gooch Crucibles, Royal Meissen Porcelain, with perforated bottom, and cover.

PLATINUM WARE

- 2908 5 Feet No. 27 Platinum Wire.
- 2960 6 Platinum Crucibles, with covers, best hammered ware; capacity, 15 cc's; weight, 15 grammes each.
- 2964 1 Platinum Cylinder and Spiral for quantitative determination of copper by electrolysis; cylinder, 2x1 inch; total weight, about 20 grammes.

LABORATORY EQUIPMENT—Continued

GLASSWARE

- 768 36 Nests, Nos. 1 to 6, Bohemian style, Griffin's Lipped Beakers.
- 934 12 Sets Reagent Bottles of 12 each, made from glass containing no lead, zinc or other metallic flux; with raised letters ground on the surface, giving name and formula of reagent. Each set to consist of:
- | | |
|----------------------------|------------------------------|
| 1 Hydrochloric Acid, Conc. | 1 Nitric Acid, Conc. |
| 1 Hydrochloric Acid, Dil. | 1 Nitric Acid, Dil. |
| 1 Acetic Acid. | 1 Ammonium Hydroxide. |
| 1 Sulphuric Acid, Conc. | 1 Ammonium Chloride. |
| 1 Sulphuric Acid, Dil. | 1 Ammonium Sulphide (Amber). |
| 1 Potassium Hydroxide. | |
- All of the above bottles to be of 8 oz. capacity.
- 936 3 Sets Reagent Bottles of four each, similar to above, except to consist of:
- | | |
|-----------------------|----------------------|
| 1 Ammonium Hydroxide. | 1 Nitric Acid. |
| 1 Sulphuric Acid. | 1 Hydrochloric Acid. |
- All of above bottles to be of 16 oz. capacity.
- 926 2 Sets of Reagent Bottles of 4 oz. capacity, as follows:
- | | |
|----------------------------|---------------------------|
| 1 Hydrogen Sulphide. | 1 Calcium Hydroxide. |
| 1 Potassium Ferrocyanide. | 1 Magnesium Sulphate. |
| 1 Potassium Sulphocyanide. | 1 Mercuric Chloride. |
| 1 Potassium Carbonate. | 1 Silver Nitrate. |
| 1 Potassium Sulphate. | 1 Lead Acetate. |
| 1 Potassium Iodide. | 1 Ferrous Sulphate. |
| 1 Potassium Ferricyanide. | 1 Ferric Chloride. |
| 1 Potassium Hydroxide. | 1 Alcohol. |
| 1 Ammonium Sulphide. | 1 Ammonium Sulphocyanide. |
| 1 Ammonium Chloride. | 1 Barium Hydroxide. |
| 1 Ammonium Carbonate. | 1 Barium Carbonate. |
| 1 Ammonium Oxalate. | 1 Ether. |
| 1 Sodium Phosphate. | 1 Cupric Sulphate. |
| 1 Barium Chloride. | 1 Sodium Carbonate. |
| 1 Calcium Chloride. | 1 Sodium Hydroxide. |
| 1 Calcium Sulphate. | 3 Blank Label Bottles. |
- 966 3 Doz. 1-gallon Green Glass so-called Acid Bottles, for storage of standard solutions.
- 950 3 Doz. Bottles, 2 oz., extra wide mouth, flint glass, for salts.
- 1006 15 Dropping Bottles, indicator containers.
- 1034 18 Wash Bottles, 24 oz., complete with rubber stoppers and glass tubes.

LABORATORY EQUIPMENT—Continued

GLASSWARE — Continued

- 1102 27 Burettes, Mohr's, with Geissler's Glass Stopcock, 50 cc. capacity. Graduated in 1-10 cc.
- 2108 18 Funnel Tubes, bent, thistle top.
- 2324 7 Pounds Soft Glass Tubing, 5 mm. o. d.
- 2324 7 Pounds Soft Glass Tubing, 7 mm. o. d.
- 2324 4 Pounds Soft Glass Rods, 5 mm. o. d.
- 2924 9 $\frac{1}{2}$ -gallon Percolators, conical form, flint glass.
- 2938 18 Volumetric Pipettes, most accurately graduated; capacity, 10 cc.
- 2938 9 Volumetric Pipettes, most accurately graduated; capacity, 25 cc.
- 2190 3 Sulphuretted Hydrogen Generators, Kipp's form.
- 3498 4 $\frac{1}{2}$ Gross Test Tubes, best German glass, well annealed, free from lead, each piece wrapped in paper, 6x $\frac{5}{8}$ inches.
- 3498 1 $\frac{1}{2}$ Gross Test Tubes, best German glass, well annealed, free from lead, each piece wrapped in paper, 3x $\frac{3}{8}$ inches.
- 1982 9 Filter Flasks, conical, with side neck, for use with filter pump; capacity, 8 oz.
- 1632 18 Graduated Cylinders, with lip, double graduation in cc. up and down; capacity, 50 cc.
- 1632 3 Graduated Cylinders with lip, double graduation in cc. up and down; capacity, 500 cc.
- 1632 2 Graduated Cylinders with lip, double graduation in cc. up and down; capacity, 1000 cc.
- 1652 18 Scheibler's Desiccators, with knob top, diameter 6 inches.
- 1976 54 Copper Determination Flasks, made of resistance glass, pear shape, wide mouth and broad flange; capacity, 8 oz.
- 1970 18 Erlenmeyer Flasks, resistance glass; capacity, 4 oz.
- 1970 18 Erlenmeyer Flasks, resistance glass; capacity, 6 oz.
- 2016 12 Volumetric "Litre Flasks," graduated; capacity, 1000 cc.
- 2016 12 Volumetric "Litre Flasks," graduated; capacity, 250 cc.
- 2066 36 Bunsen Funnels, with thin and extra long stems, top ground even and stem ground to a point. Angle, 60°; diameter, 2 $\frac{1}{2}$ inches.
- 2066 36 Bunsen Funnels, with thin and extra long stems, top ground even and stem ground to a point. Angle, 60°; diameter, 3 inches.
- 2050 9 Funnels; diameter, 8 inch, best German glass.
- 3506 2 Thermometers, Chemical, scale engraved on stem, with white back, very exact, graduated to 200° C.

LABORATORY EQUIPMENT—Continued**GLASSWARE—Continued**

- 3016 9 Potash Bulbs, Geissler's, plain, for steel analysis.
3708 18 Calcium Chloride Tubes, Volhard's; length, 5 inches.
3736 18 Gooch Filtering Tubes for Gooch Crucibles.
3800 72 Watch Glasses, well annealed, with ground edges; diameter, $2\frac{1}{2}$ inches.
3800 72 Watch Glasses, well annealed, with ground edges; diameter, 3 inches.
3800 72 Watch Glasses, well annealed, with ground edges; diameter, 4 inches.
3800 72 Watch Glasses, well annealed, with ground edges; diameter, 5 inches.
534 3 Sets, 4 each, Scale Feet, for holding leveling screws of balances, giving perfect insulation.

IRONWARE

- 1228 2 Bunsen's Blast Lamps for Gas, improved form.
1152 18 Bunsen Burners, usual size, with air regulation.
1222 2 Fletcher's Radial Burners, for hood purposes.
1884 2 Richard's Filter Pumps.
2420 1 Electric Hot Plate, three heats, from 100° to 600° F.; size, 12x24 inches.
3004 2 Pairs Pliers, side cutting, steel; length, 5 inches.
3206 18 Sand Baths, sheet iron, shallow; diameter, 4 inches.
3228 2 Nests Sieves, 10, 20, 30, 40, 60, 80, 100, 120, 150, 200 mesh, ten in each nest; diameter, 8 inches.
3288 18 Spatulas, steel, with cocoa wood handles; blade, 4 inches.
3400 12 Rectangular Base Ring Stands for Flasks, retorts, etc., complete with 2, 3 and 4 inch rings.
1394 12 Burette Clamps, with set screws to attach to retort stand.
1820 18 Triangular Files; length, 4 inches.
3666 36 Iron Tripods for Bunsen Burners.
3568 18 Crucible Tongs, rod iron, double bent, Jap.; length, 9 inches.

WOODENWARE

- 3424 18 Burette Supports, hardwood clamp, lined with cork, holding two burettes each.
3444 18 Funnel Supports, one double arm for four funnels.
3456 12 Test Tube Racks, for 13 tubes, in two shelves, with 7 pins and $\frac{7}{8}$ -inch holes.

LABORATORY EQUIPMENT—Continued**RUBBER MATERIAL**

- 794 2 Fletcher's Blowers, Foot Bellows, gives continuous blast of air; No. 9; diameter, $7\frac{1}{4}$ inches.
- 3140 9 Yards Black Rubber Sheeting, vulcanized on muslin.
- 3136 8 Lbs. Rubber Stoppers, assorted, solid, 1 and 2 holes.
- 3148 60 Feet $\frac{3}{8}$ -inch Pure Gum Rubber Tubing; 60 feet $\frac{1}{4}$ -inch pure gum rubber tubing.
- 3152 60 Feet $\frac{1}{4}$ -inch Rubber Tubing, white, light wall, hand made, for gas connections.
- 3154 4 Feet Gooch Rubber Tubing, band, pure gum, light wall, for Gooch crucibles.

MISCELLANEOUS

- 1082 18 Brushes, Bristle, for test tubes, with sponge ends for protection to test tube ends.
- 1086 6 Brushes, Bristle, for burettes; length, 36 inches.
- 1074 18 Camel Hair Brushes, extra large stock, quill holder, $\frac{1}{2}$ -inch.
- 2584 20 Boxes Gummed Labels, colored rims, No. 261; 20 boxes gummed labels, colored rims, No. 201.
- 2792 1 Agate Mortar, with pestle; size, $3\frac{1}{2}$ inches.
- 3330 1 Ralston New Process Still, of copper-plated pure block tin, with pura germ-proof aerating cap.
- 1366 18 Test Tube Clamps, of spring wire, for all sizes test tubes.
- 1354 18 Chaddock Beaker Clamps, of Japanned spring wire, rubber covered jaws.
- 1362 36 Pinch-Cocks, nickel-plated, strong spring.
- 1384 30 Clamps for Tubing; width, $1\frac{1}{4}$ inches.
- 1474 5 Gross Assorted Corks.
- 1546 12 Nickel Crucibles of pure nickel for alkaline fusions.
- 1752 2 Drying Ovens, single wall of copper, with opening for thermometer, movable shelf and extra sheet iron bottom.
- 1844 36 Pkgs. S. & S. "White Ribbon" Filter Paper, washed with hydrochloric and hydrofluoric acids, quick filtering and retaining BaSO_4 ; diameter, 9 cm.; 36 pkgs. same, 7 cm.
- 3598 18 Pipe Stem Triangles, improved form, small; 18 same, medium.
- 3868 18 Wire Gauze, with asbestos center, 6 inches square.

For Laboratory Furniture, see special section, pages 422, 423, 424.

NOTE:—It is impossible to select an outfit adaptable to every one's wants, therefore, we have endeavored to give but a general idea of what will be required, and you can add or omit any items or change the amounts to suit your requirements.

SET OF BLOW PIPE APPARATUS

AS DESCRIBED IN "BROWN'S MANUAL OF ASSAYING"

3898

- | | |
|---|---------------------------------------|
| 1. 1 Charcoal Borer, Club Shape. | 9. 1 Set, (3) Porcelain Dishes. |
| 2. 1 Charcoal Borer with Spatula. | 10. 1 Pair Platinum Pointed Forceps. |
| 3. 1 Charcoal Saw. | 11. 1 Pair Heavy Tip Steel Forceps. |
| 4. 1 Chamois Skin. | 12. 1 Pair Steel Forceps. |
| 5. 1 Camel Hair Brush. | 13. 1 Glass Alcohol Lamp. |
| 6. Coal and Ash Trays. | 14. 6 Glass Tubes. |
| 7. ½ Dozen Charcoals. | 15. 2 Books Test Papers. |
| 8. 1 Diamond Steel Mortar. | 16. Frame with 18 Glass-stoppered and |
| Labeled Reagent Bottles, containing the following Reagents: | |
| Borax Powder. | Borax Glass. |
| Boracic Acid, Cryst. | Bismuth Flux. |
| Bone Ash, Sieved. | Bone Ash, Washed. |
| Charcoal. | Copper Oxide. |
| Plattner's Flux. | Potash Oxalate. |
| Soda Nitrate. | Test Lead. |
| 17. 1 Knife. | 24. 1 Plattner's Blow Pipe N. P. |
| 18. 1 Pair Nippers. | 25. 1 Steel Hammer, Wire Handle. |
| 19. 1 Set Moulds and Stamps. | 26. 1 Plattner's Blow Pipe Lamp with |
| 20. 1 Steel Chisel. | Swivel. |
| 21. 1 Pair Scissors. | 27. 1 Platinum Holder, with 6 Wires. |
| 22. 1 Matrass Holder. | 28. 1 Double Lens. |
| 23. 1 Platinum Tip for Blow Pipe. | 29. 1 Dropping Pipette. |
| | 30. 6 Matrasses. |

Price for complete set, securely packed in neat wooden carrying case, including
 "Quantitative Assaying with the Blow Pipe" by E. L. Fletcher, net. \$30.00

PROSPECTOR'S BLOW PIPE OUTFIT No. 1

3900

- | | |
|--------------------------------------|-----------------------------------|
| 1 Alcohol Lamp. | 1 Porcelain Mortar, 2¼ inch. |
| 1 Chamois Skin. | 2 Porcelain Crucibles. |
| 3 Carbon Sticks. | 2 Porcelain Crucible Covers. |
| 1 dozen Test Tubes, 3-inch. | 1 Pkg. Filter Paper. |
| 1 doz. Glass Tubes and Rods, Asst'd. | 3 Small Beakers, 0 to 000. |
| 2 drs. Ferrous Sulphate. | 1 oz. Sulphuric Acid C. P. Conct. |
| 2 drs. Borax Glass. | 1 oz. Muriatic Acid C. P. Conct. |
| 2 drs. Oxalic Acid. | 4 oz. Alcohol. |
| 2 drs. Sodium Carbonate, Dry. | 2 oz. Mercury. |
| 2 drs. Carbonate Potash. | 2 oz. Granulated Lead. |
| ½ doz. Charcoals. | ¼ lb. Nitric Acid, C. P. Conct. |
| 1 Funnel Glass, 2-inch. | ¼ lb. Ammonia, Strong. |
| 1 H. S. Magnet, 3-inch. | 1 Piece Tinfoil. |
| 1 Jeweler's Blow Pipe N. P. | 1 Piece Copper Wire. |
| 1 Magnifying Glass Lens, Double. | 1 Piece Sheet Zinc. |
| 1 Piece Iron Wire. | 1 Spatula, 3 inches. |
| 1 Platinum Wire and Holder. | 1 Pair Slag Forceps. |

Price, Packed in Fine Wooden Carrying Case, Metal Handle. \$10.00
 "Cornwall's Blow Pipe Analysis," Extra 2.50

The above is a cheap, condensed list of apparatus and chemicals for practical work.
 "Cornwall's Blow Pipe Analysis" will be found a satisfactory guide in making blow pipe tests.

PROSPECTOR'S BLOW PIPE OUTFIT No. 2

3902

- | | |
|-------------------------------------|--|
| 1 Anvil. | 1 Piece Copper Wire. |
| 1 Agate Mortar, 1½-inch. | 1 Piece Zinc Sheet. |
| 2 Porcelain Dishes. | 1 Piece Magnesium Ribbon. |
| 2 Glass Funnels. | 1 Spool Iron Wire, Pure. |
| 1 Doz. Test Tubes. | 1 Pair Forceps. |
| 1 Doz. Glass Tubes and Rods. | 1 Magnet, 3-inch. |
| 3 Small Beakers. | 1 Hammer. |
| 1 Bone Spoon. | 1 Platinum Wire and Holder. |
| 1 Dr. Potash Bisulphate, C. P. | 2 Books Litmus Paper. |
| 1 Dr. Copper Oxide, C. P. | 1 Sheet Turmeric Paper. |
| 1 Dr. Copper Sulphate. | 2 Ozs. Muriatic Acid, C. P., Conct. |
| 1 Dr. Calcium Carbonate. | ½ Lb. Nitric Acid, C. P., Conct. |
| 1 Dr. Oxalic Acid. | 2 Ozs. Sulphuric Acid, C. P., Conct. |
| 1 Dr. Silver Nitrate. | 2 Ozs. Ammonia, Conct. |
| 2 Drs. Sodium Carbonate, dry, C. P. | 2 Ozs. Mercury. |
| 2 Drs. Borax Glass. | ½ Lb. Bone Ash. |
| 2 Drs. Microcosmic Slat, C. P. | ½ Pt. Alcohol. |
| 2 Drs. Lead, Finely Powdered, C. P. | ½ Doz. Charcoals. |
| 2 Drs. Lead Flux. | 1 Pocket Magnifying Lens, Double. |
| 1 Piece Silver Foil, C. P. | 1 Pair Platinum Pointed Forceps. |
| 1 Piece Tin Foil, C. P. | 1 Oil Lamp (Berzelius). |
| 1 Piece Copper Foil, C. P. | 1 Alcohol Lamp. |
| | 1 Plattner's Blow Pipe and Platinum Tip. |

Apparatus and Chemicals for Field Work, securely packed in convenient portable case of hard wood. \$20.00

COMPLETE ASSAY OUTFIT FOR MINE

3904

- | | |
|-------------------------------------|---|
| 1 Gold Button Balance. | 1 Slag Anvil, 6 x 6 inches. |
| 1 Silver Button Balance. | 1 Sheet Asbestos Board, 40 x 40 x ¼ in. |
| 1 Analytical Balance. | 1 Blast Lamp. |
| 1 Bullion Balance. | 1 Doz. Griffin Beakers, No. 1. |
| 1 Pulp Balance. | 2 Doz. Griffin Beakers, No. 2. |
| 1 Set Weights, 1 Grm. to 1-10 Mg. | 1 Doz. Griffin Beakers, No. 3. |
| 1 Set Weights, 50 Grm. to 1 Mg. | 2 Doz. R. B. Crucibles, No. 00. |
| 1 Set Weights, 1 A. T. to 1-20. | 6 Spun Iron Crucibles, 1 oz. |
| 16 Glass Scale Feet. | 1 Jeweler's Blow Pipe. |
| 4 Rubber Balance Covers. | 3 Doz. Taper Corks, Med., Asst'd |
| 1 Moisture Scale, 1 Kg. | 6 Bottles G. S., 500 cc. |
| 1 Union Flux Scale. | 6 Bottles G. S., 500 cc. Amber. |
| 6 C. H. Pencils, Med. | 2 Dropping Bottles, Schuster's, 1 oz. |
| 1 C. H. Brush, ½ inch, Round Quill. | 3 Wash Bottles, 1000 cc. |
| 1 C. H. Brush, 1 inch, H. R. B. | 6 Reagent Bottles, 8 oz. |
| 1 Test Tube Brush, ¾-inch. | 6 Casseroles, R. B. No. 2. |
| 2 Buckboard Brushes, 4 inches. | 6 Casseroles, R. B. No. 3. |
| 1 Buckboard Cleaning Brush. | 6 Watch Glasses, 3-inch. |
| 2 Button Brushes. | 6 Watch Glasses, 3½-inch. |
| 1 Doz. Annealing Cups. | 1 Button Tray. |
| 1 Annealing Cup Tray. | 1 Test Tube Clamp. |
| 4 Burettes, 50 cc. 1-10 G. S. | 2 Hoffman Clamps, Med. |
| 4 Burette Caps. | 3 Mohr's Pinch-Cocks, Med |
| 2 Burette Floats. | 1 Pair Asbestos Mittens. |

COMPLETE ASSAY OUTFIT FOR MINE

CONTINUED

- 1 Samson Crusher, 00 Hand or Power.
- 1 Disc Sample Grinder, McCool
- 1 Disc Sample Grinder, Braun.
- 2 Buckboards, 20x24 inches.
- 2 Mullers and Handles.
- 3 Percolators, $\frac{1}{2}$ Gal.
- 2 Pipettes, Vol. 10 cc.
- 1 Pipette, Vol. 25 cc.
- 1 Pipette, Vol. 50 cc.
- 1 Pair Button Pliers.
- 1 Pair Cutting Pliers.
- 1 "Covers" Respirator.
- 6 Roasting Dishes, 6 inch.
- 1 Metal Roll, No. 2.
- $\frac{1}{2}$ lb. Rubber Stoppers, Asst'd.
- 12 Ft. Pure Gum Tubing, $\frac{1}{4}$ in. Med.
- 6 Ft. Pure Gum Tubing, $\frac{1}{4}$ in. Med.
- 2 Ft. Pure Gum Tubing, $\frac{1}{2}$ in. Med.
- 2 Yds. Rubber Sheeting, Black.
- 1 Sampler and Scoop, 12x12 inch.
- 2 Doz. Tin Sample Pans, 6 in. Diam.
- $\frac{1}{2}$ Doz. Sheet Iron Sample Pans, 6x9.
- 2 Horn Scoops.
- 3 Sand Baths, 6 inch.
- 1 Pair Hand Shears, 9-inch Blade.
- 1 Pair Tinner's Snips, 2 $\frac{1}{2}$ inch.
- 1 Nest Sieves, 8-inch Diameter;
Nos. 20, 30, 40, 50, 60, 80, 100, 120,
150 and 200.
- 1 Doz. Erlenmeyer Flasks, 6 oz.
- 1 Doz. Copper Flasks, 1 Liter.
- 2 R. N. Flasks, 1 Liter.
- 1 Doz. Parting Flasks, 1 oz.
- 1 Volumetric Flask, 500 cc.
- 1 Volumetric Flask, 1000 cc.
- 2 Spatulas, 4 inches.
- 1 Spatula, 6 inches.
- 1 Spatula, 8 inches.
- 1000 Weaver Mailing Envelopes, 2 oz.
- 1000 Union Ore Bags.
- 50 Duck Ore Bags, 6x10 inches.
- 5 Pairs Forceps.
- 1 Ralston Still.
- 1 Steel Gold Pan.
- 1 Kipp H₂ S Generator, 1000 cc.
- 1 Agate Mortar, 3 inches.
- 1 Pestle for same.
- 1 Leeds Mortar.
- 1 Wedgewood Mortar.
- 1 No. 3 Pestle for same.
- 3 Glass Y Tubes, $\frac{1}{4}$ inch.
- 3 Glass T Tubes, $\frac{1}{4}$ inch.
- 1 Braun Cupel Machine, 1 $\frac{1}{4}$ and 1 $\frac{1}{2}$ in.
- 1 Brass Cupel Mould, 1 $\frac{1}{4}$ inches.
- 1 Cupel Tray.
- 1 Cupel Shovel.
- 1 Cupel Rake.
- 1 Scheibler Desiccator, 6 in. and Plate.
- 1 Graduated Cylinder, 25 cc.
- 1 Graduated Cylinder, 100 cc.
- 1 Graduated Cylinder, 250 cc.
- 1 Set Steel Letters, $\frac{1}{8}$ inch.
- 1 Set Steel Figures, $\frac{1}{8}$ inch.
- $\frac{1}{2}$ Doz. R. B. Evaporating Dishes, No. 1.
- $\frac{1}{2}$ Doz. R. B. Evaporating Dishes, No. 6.
- $\frac{1}{2}$ Doz. R. B. Evaporating Dishes, No. 9.
- 1 Bbl. Crucibles, 15 Gr.
- 1000 Scorifiers, 2 $\frac{1}{2}$ inch, Colorado.
- 2 Triangular Files, 5 inch.
- 1 Round File, 6 inch.
- 1 Drying Oven, 8x10 inches.
- 1 Support for same.
- 500 Filter Papers, 11 cm.
- 500 Filter Papers, 18 cm.
- 100 Filter Papers, B and A Double
Washed, 9 cm.
- 1 Doz. Bunsen Funnels, 2 $\frac{3}{4}$ inch.
- $\frac{1}{4}$ Doz. German Funnels, 4 inch.
- 1 Slag Hammer, 1-3-16 lbs.
- 1 Slag Hammer, 8 oz.
- 2 Chaddock's Burette Supports.
- 1 Funnel Support for 15 Funnels,
Wooden.
- 1 Wooden Funnel Support.
- 1 Test Tube Support for 12.
- 2 Doz. Test Tubes, 5x $\frac{5}{8}$ inches.
- 1 Pouring Mould, 12-Hole.
- 1 Pouring Mould, 6-Hole, Heavy.
- 1 lb. Sealing Wax.
- 1 Electric Hot Plate, 12x18 inches.
- 1 Gasoline Stove, 2 Burners.
- 1 Colorado Muffle Furnace LD.
- 4 Colorado Muffles, LD, 10 $\frac{3}{4}$ x16x6.
- 1 Blow Pipe Tank complete, 8-gal.,
ready for use.
- 1 Cary Burner, 2-inch.
- 1 Chemical Thermometer, 250° C.
- 1 Magnifier, Double Lens.
- 3 Precipitating Jars, 1 qt.
- 1 lb. Glass Tubing and Rods.
- 1 Pair Crucible Tongs, 9-inch, N. P.
- 1 Pair Crucible Tongs, 9-inch, Steel.
- 1 Pair Scorifier Tongs, 36-inch, for
2 $\frac{1}{2}$ -inch Size.
- 1 Pair Scorifier Tongs, 36-inch, for
3-inch Size.

COMPLETE ASSAY OUTFIT FOR MINE

CONCLUDED

- | | |
|---|---|
| 1 Pair Cupel Tongs, 36 inch. | $\frac{1}{4}$ lb. Sodium Phosphate, C. P. |
| 6 Pipe Stem Triangles. | $\frac{1}{2}$ lb. Sodium Carbonate, Anhyd., C. P. |
| 1 Iron Support, 3 Rings. | $\frac{1}{2}$ lb. Sodium Hyposulphite, C. P. |
| 1 Tripod, 3 Rings. | 9 lbs. Sulphuric Acid, C. P. |
| 1 Cupel Mallet, Rawhide. | 2 lbs. Iron Sulphide. |
| 2 Pencils for Glass. | $\frac{1}{4}$ lb. Copper Sulphate, C. P. |
| 1 Hydrometer for Heavy Liquids. | 1 oz. Silver Nitrate, C. P. |
| 1 Hydrometer for Light Liquids. | $\frac{1}{4}$ lb. Manganese Sulphate, C. P. |
| 1 Copper Water Bath. | 1 lb. Acetic Acid, C. P., 99 $\frac{1}{2}$ %. |
| 1 Lead Measure. | 10 lbs. Silica Powder. |
| 1 Set Cork Bore, Nos. 1 to 6. | 1 oz. Copper Foil, C. P. |
| 3 Boxes Gummed Labels. | 1 oz. Iron Wire, C. P. |
| 1 Doz. Watch Glasses, 3 $\frac{1}{2}$ inch. | $\frac{1}{2}$ lb. Reddle. |
| 2 Doz. Watch Glasses, 4 inch. | 2 Books Litmus Paper. |
| 1 Doz. Watch Glasses, 4 $\frac{1}{2}$ inch. | $\frac{1}{2}$ lb. Potassium Permanganate, C. P. |
| 2 Alcohol Lamps, Brass, 8 oz. | $\frac{1}{4}$ lb. Potassium Bichromate, C. P. |
| 1 Dangler Lamp. | $\frac{1}{4}$ lb. Potassium Iodide, C. P. |
| 1 Color Plate, 12 Cavities. | $\frac{1}{4}$ lb. Potassium Bichromate, C. P. |
| 5 lbs. Zinc Shavings. | $\frac{1}{2}$ lb. Potassium Ferrocyanide, C. P. |
| $\frac{1}{2}$ lb. Zinc, Granulated, C. P. | $\frac{1}{4}$ lb. Potassium Ferricyanide, C. P. |
| $\frac{1}{2}$ lb. Zinc Oxide, C. P. | $\frac{1}{2}$ lb. Potassium Carbonate, C. P. |
| 1 oz. Lead Sulphate, C. P. | $\frac{1}{2}$ lb. Potassium Caustic, C. P., by Alc. |
| 10 lbs. Lead Acetate, Comm'l. | $\frac{1}{2}$ lb. Potassium Chlorate, C. P. |
| 1 lb. Lead Acetate, C. P. | 2 lbs. Potassium Cyanide, Merck, Pure. |
| 50 lbs. Lead, Granulated, C. P. | $\frac{1}{2}$ lb. Oxalic Acid, C. P. |
| 8 lbs. Ammonia, C. P. | $\frac{1}{4}$ lb. Ammon. Sulphate, C. P. |
| 1 oz. Uranium Acetate, C. P. | 1 lb. Ammon. Acetate, C. P. |
| 100 lbs. Litharge, C. P. | $\frac{1}{4}$ lb. Ammon. Oxalate, C. P. |
| 21 lbs. Nitric Acid, C. P. | $\frac{1}{2}$ lb. Ammon. Carbonate, C. P. |
| $\frac{1}{2}$ lb. Stannous Chloride, C. P. | 1 oz. Ammon. Molybdate, C. P. |
| 1 Keg Soda Bicarbonate. | 1 lb. Ammon. Chloride, C. P. |
| 1 oz. Silver Foil, C. P. | $\frac{1}{4}$ lb. Aluminum Sheet, C. P. |
| 5 lbs. Lead Foil, C. P. | $\frac{1}{4}$ lb. Tannic Acid, C. P. |
| 50 lbs. Potash Carbonate. | 1 lb. Tartaric Acid, C. P. |
| 50 lbs. Borax Glass. | 1 Gal. Alcohol, 96 %. |
| 200 lbs. Bone Ash. | 1 lb. Barium Chloride, C. P. |
| 10 lbs. Argols. | 1 lb. Barium Chloride, Granulated,
for Desiccator. |
| $\frac{1}{2}$ lb. Tin, Granulated, C. P. | |
| 12 lbs. Hydrochloric Acid, C. P. | |

In the above we have made an effort to select an outfit that will answer every requirement in a complete assay office. Make your selection from it, add any items not listed, and mail it to us for our net prices. This list contains many duplicates; you can omit any not required. "We guarantee satisfaction."

ASSAY OUTFIT FOR PROSPECTORS

3906	6 Annealing Cups.	6 Parting Flasks.
2 Hammers.	1 Quart Mortar and Iron Pestle.	
1 Portable Button Balance and Weights.	2 Pairs Tongs.	
1 Pulp Balance and Weights.	1 Blow Pipe, Plattner's.	
1 Tripod.	1 Furnace (Brown or "Burro") or	
1 Pint Alcohol.	1 Gasoline Furnace with Blow Pipe Tank.	
3 Funnels.	1 Spatula.	
1 Pkg. Filter Paper.	1 Glass Rod and Tubes.	
1 Button Brush.	3 Beakers and Covers.	
4 lbs. Litharge.	1 Sieve, 60 Mesh.	
2 lbs. Lead Flux.	1 Magnet.	
10 lbs. Bone Ash.	1 Wash Bottle.	
10 lbs. Granulated Lead, C. P.	1 Glass Alcohol Lamp.	
$\frac{1}{2}$ lb. Rolled Lead, C. P.	3 Pairs Pliers.	
5 lbs. Soda Bicarbonate.	1 Magnifying Lens.	
2 lbs. Borax Glass.	50 Crucibles.	
1 lb. Argols.	2 Muffles.	
1 lb. Nitric Acid, C. P.	200 Scorifiers.	
$\frac{1}{4}$ oz. Silver Foil, C. P.	1 Lead Mould.	
1 lb. Muriatic Acid, C. P.	1 Cupel Mould.	

In the above list we have figured on standard goods. Any variation can be noted in ordering, and we will revise our prices to suit.

Price, Complete, Packed for Shipment..... \$125.00

PROSPECTOR'S OUTFIT

3908 The following list is intended for ordinary prospecting trips, and contains everything that a prospector, without a knowledge of chemistry, requires. Other articles, such as spirit lamp, alcohol, sieves, etc., might be added but can be dispensed with, and have been omitted on account of weight and bulk. The liquids are packed in individual wooden packages.

1 Prospector's Pick.	2 Candles.
3 oz. Nitric Acid, C. P.	1 Prospector's Mortar and Pestle.
6 Test Tubes.	3 oz. Muriatic Acid, C. P.
1 Miner's Gold Washing Horn.	3 oz. Concentrated Ammonia.
4 oz. Sulphuric Acid, C. P.	1 Magnifying Glass.
1 Test Tube Clamp.	1 oz. Chloride Tin (Stannous).
Price, Complete Outfit.....	\$5.00

PROSPECTOR'S OUTFIT, INCLUDING BLOW PIPE APPARATUS

3910 This is intended to fill the requirements of those desiring a prospector's outfit and portable blow pipe apparatus for making simple tests by this process. Complete outfit (as below)..... \$12.50

6 Test Tubes, 6 inch.	1 Test Tube Clamp.	1 Prospector's Pick.
1 Blow Pipe, 10 inches.	1 Magnet, 5 inches.	1 Pair Pliers, 5 inches.
1 Block Charcoal.	$\frac{1}{4}$ lb. Lead Foil.	$\frac{1}{4}$ lb. Saltpetre.
1 Ivory Scale for Blow Pipe Beads.	1 Prospector's Mortar and Pestle.	
6 Closed Glass Tubes, $\frac{1}{8}$ inch.	1 Miner's Gold Washing Horn.	
3 Open Glass Tubes, $\frac{1}{8}$ inch, Hard Glass.	1 Magnifying Glass, Double Lens.	
2 Books Litmus Paper.	1 Alcohol Lamp, Brass.	
2 Books Turmeric Paper.	1 Piece Platinum Wire.	
2 Sheets Brazil Wood Paper.	1 Quart Wood Alcohol.	
1 oz. Microcosmic Salts.	$\frac{1}{4}$ lb. Bicarbonate Soda.	
$\frac{1}{4}$ lb. Potash Nitrate (Pure).	1 oz. Bisulphate Potash.	
1 oz. Cobalt Nitrate.	1 oz. Chloride Tin (Stannous).	
4 oz. Nitric Acid, C. P.	4 oz. Concentrated Ammonia.	
4 oz. Muriatic Acid, C. P.	4 oz. Sulphuric Acid, C. P.	

COPPER ASSAY OUTFITS

No. 3912

OUTFIT FOR COPPER DETERMINATION BY CYANIDE OF POTASSIUM METHOD

- | | |
|---|---|
| ½ Pound Asst'd Glass Rod and Tubing. | 1 Analytical Balance, sensitive to 1-10 Mg., with Rider Attachment. |
| 2 Burettes, 50 cc. 1-10 with Glass Cocks. | 1 Set Weights, 50 Grams to 1 Mg., with Riders. |
| 1 Burette Stand. | 1 Kerosene Stove. |
| 2 Funnel Stands. | 1 Graduate, 8 ounce. |
| 6 Beakers, 20 ounce. | 1 Graduated Cylinder, 10 cc. |
| 6 Beakers, 12 ounce. | 4 Pipettes, 10 cc. |
| 6 Beakers, 8 ounce. | 6 Sand Baths. |
| 1 Gallon Distilled Water. | 1 Sampler and Scoop. |
| 1 oz. Copper Foil, C. P. | 1 Agate Mortar and Pestle. |
| 1 lb. Potassium Cyanide 98-99%. | 1 Iron Mortar and Pestle. |
| 9 lbs. Sulphuric Acid, Com'l. | 6 Casseroles, 4 inch Diameter. |
| 8 lbs. Concentrated Ammonia, C. P. | 2 Books Litmus Paper. |
| 7 lbs. Nitric Acid, C. P. | 1 Box Blank Labels. |
| 7 lbs. Nitric Acid, Com'l. | 2 Pairs Pincers. |
| 6 lbs. Hydrochloric Acid, Com'l. | 1 Buckboard and Muller. |
| 1 lb. Sulphuric Acid, C. P. | 2 Spatulas. |
| 1 Wash Bottle, 16 oz. | 2 Sieves, 80 and 100 Mesh. |
| 6 Amber Colored Bottles, 5 pts. | 12 Copper Flasks, 16 oz. |
| 6 Funnels, Bunsen, 3½ inch. | 1 Porcelain Color Plate. |
| 6 Pkgs. Filters, 7 in. Diam. | |

Price, Complete Outfit \$135.00

OUTFIT FOR COPPER DETERMINATION BY POTASSIUM
IODIDE METHOD

No. 3914

- | | |
|--|---|
| 2 Burettes, 50 cc. in 1-10, Glass Stoppered. | 1½ Gal. Iron Mortar with Pestle. |
| 1 Burette Stand. | 1 Agate Mortar and Pestle. |
| 2 Funnel Stands. | 1 Analytical Balance, Sensitive to 1-10 Mg., with Rider Attachment. |
| 1 lb. Sulphuric Acid, C. P. | 1 Set Weights, 50 Grams to 1 Mg., with Rider. |
| ½ Gal. Grain Alcohol. | 1 Alcohol Lamp, 8 oz. |
| 7 lbs. Nitric Acid, Com'l. | 1 Kerosene Stove. |
| 5 lbs. Sodium Carbonate, Com'l. | 2 Pincers. |
| 6 lbs. Hydrochloric Acid, Com'l. | 3 Pinch-cocks. |
| 5 lbs. Hyposulphite Soda, Com'l. | 1 Graduate, 8 oz. |
| 1 oz. Copper Foil. | 1 Graduated Cylinder, 50 cc. |
| 2 oz. Potassium Iodide, C. P. | 6 Pkgs. Filters, 7 inch Diam. |
| 1 lb. Acetic Acid, C. P. | 6 Beakers, 8 oz. |
| ½ lb. Starch. | ½ lb. Asst'd Glass Rods and Tubing. |
| 1 Buckboard and Muller. | 6 Feet Rubber Tubing. |
| 1 Sampler and Scoop. | 6 Sand Baths. |
| 2 Books Litmus Paper. | 2 Sieves, 80 and 100 Mesh. |
| 1 Book Chemical Labels. | 6 Funnels, 3½ inch. |
| 1 Box Blank Labels. | 12 Copper Flasks, 16 oz. |
| 1 Wash Bottle, 16 oz. | 2 Spatulas. |
| 1 Porcelain Color Plate. | |

1 H₂S Apparatus.

Price, Complete Outfit..... \$130.00

Any modification of the above lists can be made and we will quote accordingly.

ASSAY OUTFITS

No. 3916

OUTFIT FOR THE ASSAY OF LEAD BY WET METHOD

- | | |
|--|---|
| 6 Stirring Rods. | 6 Porcelain Casseroles, 4 inch. |
| 2 Books Litmus Paper. | 6 Porcelain Capsules. |
| 6 Funnels, Bunsens, $3\frac{1}{2}$ inch. | 1 Analytical Balance, sensitive to 1-10 |
| 1 Pkg. Filter Paper, S. S. $18\frac{1}{2}$ cm. | Mg. with Rider Attachment. |
| $\frac{1}{4}$ lb. Carbonate Soda, C. P. | 1 Set Weights, 50 grams, to 1 Mg., with |
| 1 lb. Sulphuric Acid, C. P. | Riders. |
| 7 lbs. Nitric Acid, C. P. | 1 Buckboard and Muller. |
| 1 lb. Acetic Acid, C. P. | 6 Beakers, 6 oz. |
| 1 Gal. Distilled Water. | 1 Sampler and Scoop. |
| 1 Wash Bottle, 16 oz. | 2 Sieves, 80 and 100 Mesh. |

1 Kerosene Stove.

Price, Complete Outfit \$105.00

No. 3918

OUTFIT FOR RETORTING AMALGAM

- | | |
|------------------------------------|----------------------------|
| 1 Bullion Mould. | 2 Chamois Skins. |
| 1 Bullion Furnace. | 10 lbs. Potassium Nitrate. |
| 1 Burner for same. | 10 lbs. Borax Glass. |
| 1 Blow Pipe outfit for same. | 10 lbs. Soda Ash. |
| 3 Black Lead Crucibles for same. | 1 lb. Reddle. |
| 1 Pair Tongs for above. | 1 Bullion Balance. |
| 1 Amalgam Strainer. | 1 Set Weights for same. |
| 1 Black Lead Stirrer. | 1 Iron Retort. |
| 1 Quicksilver Dipper. | 1 Condenser for same. |
| 1 Quicksilver Kettle, Porc. Lined. | 1 Iron Retort Plate. |
| 1 Amalgam Mortar. | 1 Pair Asbestos Gloves. |

Price, Complete Outfit..... \$175.00

Any modification of the above lists can be made and we will quote accordingly.

MULE BACK TRANSPORTATION

If goods are to be packed for mule back, kindly so specify in ordering.

CHEMICAL APPARATUS AND CHEMICALS IN SETS

No. 3920

CHEMICAL SET No. 1, PRICE, \$17.50

Compiled especially for use in modern schools. Additions can be made if desired, and prices vary accordingly.

2 oz. Acid, Acetic.
 1 lb. Acid, Hydrochloric.
 1 lb. Acid, Nitric.
 2 lbs. Acid, Sulphuric.
 1 oz. Acid, Oxalic.
 $\frac{1}{2}$ oz. Acid, Tartaric.
 2 oz. Ammonium Chloride.
 4 oz. Ammonium Hydrate.
 1 oz. Ammonium Nitrate.
 1 oz. Ammonium Sulphide.
 1 oz. Animal Charcoal.
 $\frac{1}{2}$ oz. Antimony.
 $\frac{1}{2}$ oz. Arsenic Trioxide.
 1 oz. Alum.
 8 oz. Alcohol Methyl.
 1 oz. Barium Chloride.
 1 oz. Barium Nitrate.
 2 oz. Calcium Carbonate.
 2 oz. Calcium Fluoride.
 4 oz. Calcium Sulphate.
 1 oz. Carbon Bisulphide.
 1 oz. Charcoal.
 2 oz. Copper Sulphate.

2 oz. Ether.
 1 oz. Ferrous Sulphide.
 2 oz. Ferrous Sulphate.
 $\frac{1}{2}$ oz. Gall Nuts Powdered.
 1 oz. Gun Cotton.
 2 oz. Galena.
 1 oz. Lead Acetate.
 $\frac{1}{4}$ oz. Lead Carbonate.
 2 drs. Litmus.
 2 oz. Mercury.
 6 in. Magnesium Ribbon.
 2 oz. Magnesium Sulphate.
 1 lb. Manganese Dioxide.
 1 ft. Platinum Wire.
 2 drs. Phosphorus.
 1 oz. Potassium Bichromate.
 2 oz. Potassium Chlorate.
 2 oz. Potassium Ferrocyanide.
 1 oz. Potassium Hydrate.
 1 oz. Potassium Nitrate.
 1 oz. Strontium Chloride.
 1 oz. Strontium Nitrate.
 4 oz. Sulphur.
 1 oz. Silver Nitrate.
 1 oz. Sodium Biborate.
 1 oz. Sodium Carbonate.
 1 oz. Sodium Sulphate.
 4 oz. Zinc for making Hydrogen.

1 Test Tube.
 1 Test Tube Brush.
 1 Test Tube Holder.
 1 Glass Retort, 4 oz.
 1 Lead Dish.
 1 Pipette.
 Rubber Tubing.
 1 Evaporation Dish, 2 oz.
 1 Deflagration Spoon.
 1 1-qt. Specie Jar for Deflg.
 1 Blow Pipe.
 1 Spirit Lamp, 4 oz.

1 Glass Funnel, 2 oz.
 1 Graduate, 50 cc.
 $\frac{1}{4}$ lb. Chem. Glass Tubing, $\frac{1}{4}$ in.
 1 File, 4 inch.
 Beakers (Nest of 3).
 1 Flask, 8 oz., Florence.
 1 Evolution Flask (for making Hydrogen, Carb. Acid Gas, etc.).
 Filtering Paper, 4 in. Diam.
 Hessian Crucibles (Nest of 4).
 1 Sand Bath.
 1 Wedgewood Mortar, $2\frac{3}{4}$ in.

CHEMICAL SET No. 2

No. 3922

PRICE \$27.50

1/4 lb. Acid, Acetic.	2 oz. Lead Monoxide.
1 lb. Acid, Hydrochloric.	1 oz. Litmus (Best Cubes).
1 lb. Acid, Nitric.	12 in. Magnesium Ribbon.
1 oz. Acid, Oxalic.	2 oz. Magnesium Sulphate.
2 lbs. Acid, Sulphuric.	1 lb. Manganese Dioxide.
1 oz. Acid, Tartaric.	2 oz. Mercury.
1 oz. Ammonium Carbonate.	12 in. Platinum Wire.
2 oz. Ammonium Chloride.	1/2 oz. Phosphorus.
1/4 lb. Ammonium Hydrate.	1/2 dr. Potassium (Metallic).
1 oz. Ammonium Nitrate.	1/4 lb. Potassium Bichromate.
1 oz. Ammonium Sulphide.	2 oz. Potassium Carbonate.
1/2 pt. Alcohol, Methyl.	1/2 lb. Potassium Chlorate.
2 oz. Alum.	1 oz. Potassium Chromate.
2 oz. Animal Charcoal.	1/2 oz. Potassium Cyanide.
1/2 oz. Antimony.	1 oz. Potassium Ferricyanide.
1 oz. Arsenious Anhydride.	2 oz. Potassium Ferrocyanide.
1 oz. Barium Chloride.	1 oz. Potassium Hydrate.
1 oz. Barium Nitrate.	1 oz. Potassium Iodide.
1 oz. Borax.	2 oz. Potassium Nitrate.
1/4 lb. Calcium Carbonate.	1 oz. Potassium Permanganate.
2 oz. Calcium Chloride.	1 oz. Potassium Sulphate.
2 oz. Calcium Fluoride.	1 dr. Silver Nitrate.
1/4 lb. Calcium Sulphate.	1 dr. Sodium (Metallic).
1 oz. Carbon Bisulphide.	1/2 oz. Sodium Acetate.
1 oz. Cobalt Nitrate.	2 oz. Sodium Carbonate.
4 oz. Copper Sulphate.	1 oz. Sodium Hydrate.
2 oz. Ether.	2 oz. Sodium Hyposulphite.
2 oz. Ferrous Sulphate.	2 oz. Sodium Sulphate.
1 oz. Ferrous Sulphide.	1 oz. Di-Sodium Phosphate.
2 drs. Gall Nuts.	1 oz. Strontium Chloride.
2 oz. Galena.	1 oz. Strontium Nitrate.
1 oz. Lead Acetate.	1/4 lb. Sulphur.
2 oz. Lead Carbonate.	1/2 lb. Zinc for making Hydrogen
2 oz. Funnel	8 oz. Funnel.
Pipette	Retort, 4 oz. Glass.
12 Test Tubes.	Test Tube Cleaner.
5 Hessian Crucibles.	Jeweler's Blow Pipe.
Chemical Flask.	Deflagration Spoon.
File.	Filtering Paper, 4 in. diam.
Spirit Lamp.	Sand Bath.
1 gal. Gas Bag and Stopcock.	Graduate, 50 cc.
Pneumatic Trough, 4x7x10 in.	Retort Stand (iron rings)
Specie Jars for Deflagration, 2 qt.	Test Tube Holder.
Evolution Flask, fitted with Delivery Tube, complete, for making Hydrogen,	Beakers (nest of 4).
Carbonic Acid Gas, etc.	Evaporating Dish.
Wedgewood Mortar and Pestle, 3 in.	Wire Gauze, 4x4 in.
	Rubber Tubing.
	1/2 lb. Assorted Glass Tubing.
	Lead Dish for Hydrofluoric Acid.
	Scales and Weights, Pockets, 6 in. Beam.

CHEMICAL SET No. 3

No. 3924

PRICE, \$55.00

1 lb. Acid, Acetic.	$\frac{1}{4}$ Pint Ether.
$\frac{1}{2}$ lb. Acid, Boracic.	2 oz. Ferric Chloride.
2 oz. Acid, Citric.	1 lb. Ferrous Sulphate.
2 lbs. Acid, Hydrochloric.	$\frac{1}{4}$ lb. Ferrous Sulphide.
2 lbs. Acid, Nitric.	1 oz. Gall Nuts.
1 lb. Acid, Oxalic.	1 oz. Indigo.
1 oz. Acid, Phosphoric.	$\frac{1}{2}$ lb. Iron Fillings.
4 lbs. Acid, Sulphuric.	2 oz. Galena.
$\frac{1}{2}$ lb. Acid, Tartaric.	$\frac{1}{4}$ lb. Lead Acetate.
1 qt. Alcohol, Methyl.	1 lb. Lead Carbonate.
1 lb. Alum.	$\frac{1}{4}$ lb. Lead Nitrate.
1 pt. Aqua Ammonia.	1 lb. Lead Protoxide.
$\frac{1}{2}$ lb. Ammonium Carbonate.	1 oz. Litmus (Best Cubes).
1 lb. Ammonium Chloride.	2 oz. Logwood.
1 oz. Ammonium Molybdate.	12 in. Magnesium Ribbon.
$\frac{1}{2}$ lb. Ammonium Nitrate.	2 oz. Magnesium Chloride.
1 oz. Ammonium Oxalate.	1 lb. Magnesium Sulphate.
1 lb. Ammonium Sulphate.	2 lb. Manganese Dioxide.
2 oz. Ammonium Sulphide.	1 oz. Mercuric Chloride.
1 lb. Animal Charcoal.	4 oz. Mercury.
1 oz. Antimony (Metallic).	1 oz. Microcosmic Salt.
2 oz. Antimony Sulphide.	$\frac{1}{2}$ lb. Paraffine.
$\frac{1}{2}$ oz. Arsenicum (Metallic).	12 in. Platinum Wire.
$\frac{1}{4}$ lb. Arsenious Anhydride.	1 Platinum Sponge.
1 oz. Asbestos.	1 oz. Phosphorus.
2 oz. Barium Carbonate.	4 oz. Plumbago.
$\frac{1}{2}$ lb. Barium Chloride.	1 lb. Potassium Bichromate (red).
$\frac{1}{2}$ lb. Barium Nitrate.	1 oz. Potassium Bitartrate.
1 lb. Barium Sulphate.	$\frac{1}{2}$ lb. Potassium Carbonate.
$\frac{1}{2}$ oz. Bismuth.	1 lb. Potassium Chlorate.
$\frac{1}{2}$ lb. Bone Ash.	2 lb. Potassium Chromate (yellow).
$\frac{1}{2}$ lb. Calcium Carbonate.	1 lb. Potassium Cyanide.
1 lb. Calcium Chloride.	1 lb. Potassium Ferricyanide.
1 lb. Calcium Fluoride.	$\frac{1}{2}$ lb. Potassium Ferrocyanide.
1 lb. Calcium Sulphate.	2 oz. Potassium Hydrate (sticks).
2 oz. Carbon Bisulphide.	1 oz. Potassium Iodide.
$\frac{1}{2}$ lb. Charcoal.	$\frac{1}{2}$ lb. Potassium Nitrate.
2 oz. Cobalt Chloride.	1 oz. Potassium Permanganate.
2 oz. Cobalt Nitrate.	4 oz. Potassium Silicate.
4 oz. Copper Turnings.	$\frac{1}{2}$ lb. Potassium Sulphate.
1 oz. Copper Nitrate.	2 drs. Potassium Sulphocyanide.
1 lb. Copper Sulphate.	1 dr. Silver Nitrate.

CHEMICAL SET No. 3—Continued

1 oz. Sodium Acetate.
 $\frac{1}{2}$ lb. Sodium Biborate.
 1 oz. Sodium Bromide.
 1 lb. Sodium Bicarbonate.
 2 lbs. Sodium Carbonate.
 1 lb. Sodium Hydrate.
 2 lbs. Sodium Hyposulphite.
 1 lb. Sodium Nitrate.
 $\frac{1}{4}$ lb. Sodium Phosphate.
 1 lb. Sodium Silicate.
 1 lb. Sodium Sulphate.
 $\frac{1}{2}$ lb. Strontium Carbonate.

$\frac{1}{4}$ lb. Strontium Chloride.
 $\frac{1}{2}$ lb. Strontium Nitrate.
 2 oz. Di-Sodium Phosphate.
 2 lbs. Sulphur.
 $\frac{1}{4}$ lb. Tin (Metallic).
 1 oz. Tin Protochloride.
 1 pt. Turpentine.
 1 lb. Zinc Carbonate.
 $\frac{1}{4}$ lb. Zinc Oxide.
 1 lb. Zinc Sulphate.
 1 lb. Zinc Mossy for Making Hydrogen.

Test Glass.
 Test Tube Rack.
 Test Tube Cleaner.
 Test Tube Holder.
 4 in. Wedgewood Mortar and Pestle.
 1 gal. Gas Bag, Brass Stop-cock.
 Lead Dish for Hydrofluoric Acid.
 Iron Wire Gauze.
 2 Safety Tubes, Thistle Top.
 Hydrometer for Specific Gravity.
 1 Jar for Hydrometer.
 Pipette.
 Watch Spring for Burning in Oxygen.
 Pneumatic Trough, 4x7x10.
 Sand Bath.
 2 Specie Jars for Collecting Gases and for Deflagration.
 1 pt. Retort.
 Receiver for Retort.
 Iron Retort Stand.
 Reduction Tube for Reading Metallic Oxide.
 Set of 3 Brass Cork Borers.
 Cork Screw.
 1 Pair Crucible Tongs.
 2 Nests (5) Hessian Crucibles.

Triangular File.
 Round File.
 Alcohol Lamp.
 Nest of 3 Beakers, 3 to 16 oz.
 1 pt. Glass Funnel.
 1 4-oz. Glass Funnel.
 1 pkg. of 100 Cut Filters.
 Metric Graduate Glass, 100 cc.
 1 Set (24) Reagent Bottles.
 Woulff Bottles, 3 Necks, 1 pt.
 Brass Deflagrating Spoon.
 1 lb. Assorted Glass Tubing.
 2 doz. Assorted Test Tubes.
 2 doz. Assorted Corks.
 Evolution Flask with Funnel and Delivery Tubes for Making Hydrogen, etc.
 Chemical Thermometer.
 Balance and Weights.
 Brass Blow Pipe.
 Rubber Tubing for Gas Con.
 Polished Steel Spatula.
 3 Glass Stirring Rods.
 1 2-oz. Evaporating Dish.
 1 6-oz. Evaporating Dish.
 1 pt. Chemical Flask.
 2 4-oz. Chemical Flasks.

MINERALOGICAL COLLECTIONS

MINERALS AND HOW TO STUDY THEM

3926 In order to meet the demand for suitable material illustrative of this work of Prof. E. S. Dana, we have compiled the collection listed below. The individual specimens are thoroughly typical and carefully selected for their effectiveness in enabling the student to obtain as practical a grasp of the subject as possible.

LIST OF SPECIMENS

- | | | |
|---------------------------|------------------------------|-----------------------------|
| 1. Graphite. | *43. Rhodochrosite. | 85. Orthoclase Cleavage. |
| 2. Sulphur, Native. | 44. Sphalerite. | 86. Albite. |
| *3. Orpiment. | *45. Zincite. | 87. Oligoclase. |
| *4. Stribnite. | *46. Willemite. | *88. Labradorite. |
| 5. Molybdenite. | *47. Smithsonite. | 89. Pyroxene. |
| *6. Silver, Native. | 48. Corundum. | 90. Pyroxene, Malacolite. |
| *7. Gold, Native. | *49. Bauxite. | 91. Spodumene. |
| *8. Pyrrargyrite. | 50. Cryolite. | 92. Amphibole, Tremolite. |
| 9. Cinnabar. | 51. Fluorite. | 93. Amphibole, Actinolite. |
| *10. Copper, Native. | *52. Wavellite. | *94. Amphibole, Asbestos. |
| *11. Chalcocite. | 53. Calcite, Xlized. | 95. Amphibole, |
| *12. Bornite. | *54. Calcite, Cleavage. | Hornblende. |
| 13. Chalcopyrite. | *55. Calcite, Marble. | 96. Beryl. |
| *14. Tetrahedrite. | *56. Calcite, Mex. Onyx. | 97. Garnet. |
| *15. Cuprite. | 57. Calcite, Chalk. | 98. Muscovite. |
| 16. Malachite. | 58. Calcite, Calctufa. | 99. Biotite. |
| 17. Azurite. | 59. Aragonite. | 100. Lepidolite. |
| 18. Galena. | 60. Apatite. | *101. Clinocllore. |
| *19. Pyromorphite. | 61. Anhydrite. | 102. Chrysolite. |
| *20. Vanadinite. | 62. Gypsum. | *103. Zircon. |
| 21. Cerussite. | 63. Gypsum Selenite. | 104. Scapolite. |
| *22. Wulfenite. | *64. Gypsum Satin Spar. | *105. Vesuvianite. |
| 23. Cassiterite. | 65. Dolomite. | 106. Epidote. |
| 24. Rutile. | 66. Barite. | *107. Zoisite. |
| 25. Pyrrhotite. | *67. Witherite. | 108. Tourmaline. |
| 26. Pyrite. | 68. Celestite. | 109. Tourmaline, Rubellite. |
| *27. Marcasite. | *69. Strontianite. | *110. Topaz. |
| *28. Arsenopyrite. | 70. Halite. | 111. Titanite. |
| 29. Hematite. | 71. Quartz, Rock Crystal. | 112. Andalusite. |
| 30. Magnetite. | *72. Quartz, Milky xl. | 113. Cyanite. |
| *31. Magnetite Lodestone. | 73. Quartz, Rose. | 114. Staurolite. |
| 32. Chromite. | 74. Quartz, Smoky. | 115. Talc. |
| 33. Limonite. | 75. Quartz, Agate. | 116. Serpentine. |
| 34. Siderite. | *76. Quartz, Chalcedony. | *117. Datolite. |
| *35. Columbite. | *77. Quartz, Heliotrope. | *118. Prehnite. |
| 36. Wolframite. | *78. Quartz, Jasper. | 119. Apophyllite. |
| 37. Millerite. | 79. Quartz, Flint. | *120. Pectolite. |
| *38. Niccolite. | *80. Quartz, Silicified Wood | 121. Thomsonite. |
| 39. Garnierite. | 81. Opal. | *122. Analcite. |
| 40. Cobaltite. | *82. Opal, Geyserite. | 123. Chabazite. |
| *41. Pyrolusite. | 83. Opal, Wood Opal. | 124. Stilbite. |
| 42. Rhodonite. | *84. Orthoclase, xl. | *125. Heulandite. |

Having planned two collections, one comprising the entire list of 125 specimens enumerated above, and the other of 75 specimens selected from it (omitting the starred names), we offer them at the following prices:

Size	75 Specimens	125 Specimens
2 x 2 inches.....	\$ 7.50	\$12.50
3 x 3 ".....	16.00	22.00

SUMMARY OF MINERAL COLLECTIONS

The following summary is intended to list the different mineral collections which we offer for sale. It does not cover all of the collections which we prepare; but should enable the purchaser to determine more readily what collection is best suited to his (or her) needs than would be possible without hunting through our numerous catalogues in which most of the collections are described in detail.

Any form of mounting that is desired can be used with any of the collections; and the price will vary accordingly. If the method described is not suitable we will submit estimates for any other preferred. We recommend our improved tray for collections kept in table cases or drawers; as being cheaper than wooden blocks, and at the same time being a very neat method of display, the label always being in sight without the necessity of removing the specimen.

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SYSTEMATIC COLLECTIONS

Beginners' Collections: 36 spec. averaging 1½ in. x 1 in. wooden case	\$1.00
Beginners' Collections: 36 spec. averaging 1½ in. x 1 in. polished case	1.50
Beginners' Collections: 36 spec. averaging 1½ in. x 2 in. wooden case	2.00
Beginners' Collections: 36 spec. averaging 1½ in. x 2 in. polished case	2.50
Beginners' Collections: 72 spec. averaging ¾ in. x 1½ in. wooden case	3.00
Beginners' Collections: 72 spec. averaging ¾ in. x 1½ in. polished case	3.50
Beginners' Collections: 100 spec. averaging 1 in. x 1½ in. in trays	3.00
Dana Collection: 75 spec. averaging 2 in. x 2 in. in plain trays	7.50
Dana Collection: 125 spec. averaging 1 in. x 1½ in. in plain trays	9.00
Dana Collection: 125 spec. averaging 2 in. x 2 in. in plain trays	12.50
Dana Collection: 75 spec. averaging 3 in. x 3 in. in plain trays	16.00
Dana Collection: 125 spec. averaging 3 in. x 3 in. in plain trays	22.00
Students' Coll. 50 spec. averaging 2¾ in. x 1¾ in. compartment wooden trays and neat cloth board case	5.00
Students' Coll. 50 spec. averaging 2¾ in. x 1¾ in. compartment wooden trays and neat cloth board case	10.00
Students' Coll. 100 spec. averaging 2¾ in. x 1¾ in. compartment wooden trays and neat cloth board case	15.00
School Collection: 110 spec. averaging 3¼ in. x 2¼ in. walnut blocks or improved trays	25.00
Normal School Collection: 120 spec. averaging 4 in. x 2¾ in. in plain trays	40.00
Normal School Collection: 150 spec. averaging 3½ in. x 2½ in. walnut blocks or improved trays	50.00
Academy Collection: 180 spec. averaging 4 in. x 2¾ in. in plain trays	75.00
Academy Collection: 225 spec. averaging 3¾ in. x 2¾ in. walnut blocks or improved trays	100.00
Academy Collection: 275 spec. averaging 3½ in. x 2½ in. walnut blocks	150.00
College Collection: 350 spec. averaging 3¾ in. x 2½ in. on blocks	200.00
College Collection: 360 spec. averaging 4 in. x 2¾ in. in plain trays	200.00
College Collection: 390 spec. averaging 3½ in. x 2½ in. mtd. on blocks	250.00
University Collection: 600 spec. averaging 4 in. x 2¾ in. drawer cabinet	385.00
University Collection: 600 spec. selected quality: with collection of 50 crystal models; mounted on blocks	500.00
Complete Type Coll. 1,000 spec. averaging 4 in. x 3 in. drawer cabinet or blocks	1,000.00

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BLOW PIPE COLLECTIONS

25 spec. small size compartment case	\$ 0.75
50 spec. small size compartment case	1.50
100 spec. ¾ in. x ¾ in. pol. compartment case	4.00
200 spec. ¾ in. x ¾ in. pol. compartment case	10.00
100 spec. 2 in. x 2¾ in. trays, (100 analyses)	18.00
100 spec. 4 in. x 2¾ in. trays, (200 to 300 analyses)	37.50
50 spec. fragments in wooden boxes averaging 10 to 15 analyses	3.00
100 spec. fragments in wooden boxes averaging 10 analyses	7.00
50 spec. fragments in wooden boxes averaging 35 to 45 analyses	6.00
75 spec. fragments in wooden boxes averaging 35 to 45 analyses	10.00
100 spec. fragments in wooden boxes averaging 35 to 45 analyses	15.00
150 spec. fragments in wooden boxes averaging 35 to 45 analyses	27.00
200 spec. fragments in wooden boxes averaging 35 to 45 analyses	40.00

MINERALS BY THE POUND

All the minerals listed below are in pieces of large size, suitable for breaking up for student's use, and are of first class quality only. Blow pipe material is listed on a separate page.

The prices quoted at 40 cents or more per pound will be sold by the half pound at the same rate. No mineral by the single pound is sold for less than ten cents.

	Per lb.		Per lb.
Agate.....	\$0.20	Chrysocola.....	\$0.50
Albertite.....	.25	Chrysolite.....	.15
Albite, Cleavelandite.....	.10	Cinnabar.....	1.50
Allanite.....	.15	Cleavelandite.....	.10
Alunite.....	.15	Columbite.....	1.00
Amphibole.....	.10	Coquina.....	.20
Anhydrite.....	.10	Corundum.....	.25
Anthophyllite.....	.20	Cryolite.....	.20
Anthracite.....	.05	Dolomite.....	.10
Apatite.....	.10	Dufrenite.....	.25
Arsenopyrite.....	.10.	Emery.....	.10
Asphaltum.....	.10	Enargite.....	.75
Barite.....	.10	Enstatite.....	.15
Bauxite.....	.10	Epidote.....	.15
Beryl.....	.10	Flexible Sandstone.....	.10
Biotite.....	.20	Flint.....	.10
Bog Iron.....	.10	Fluorite.....	.10
Bornite.....	.40	Fowlerite.....	.30
Bronzite.....	.25	Galenite.....	.15
Calcite.....	.10	Garnet.....	.15
Calcite, Blue.....	.20	Garnierite.....	.50
Calcite, Chalk.....	.10	Glauconite.....	.10
Calcite, Cleavable.....	.10	Graphite.....	.15
Calcite, Iceland Spar.....	5.00	Griphite.....	.35
Calcite, Limestone.....	.10	Gypsum.....	.10
Calcite, Marble.....	.10	Gypsum, Satin Spar.....	.15
Cassiterite.....	.40	Gypsum, Selenite, N. Y.....	.10
Celestite.....	.10	Gypsum, Selenite, Utah.....	.20
Cerite.....	1.00	Halite.....	.10
Chalcedony.....	.10	Hanksite.....	1.00
Chalcopryrite.....	.25	Heliotrope.....	.80
Chalk.....	.10	Hematite.....	.05
Chert.....	.10	Hematite Kidney Ore.....	.30
Chonodrité in Calcite.....	.20	Hornblende.....	.10
Chromite.....	.15		

MINERALS BY THE POUND—Concluded

	Per lb.		Per lb.
Iceland Spar	\$4.00	Pyrite	\$0.10
Iolite	.50	Pyrolusite	.10
Iron, Meteoric (shavings) per ounce	.40	Pyrrhotite	.10
Jade	1.25	Quartz, Chalcedony	.10
Jasper	.20	Quartz, Flexible Sandstone	.10
Kaolinite	.10	Quartz, Flint	.10
Kidney Ore	.30	Quartz, Heliotrope	.80
Labradorite, N. Y.	.10	Quartz, Jasper	.25
Labradorite, Labrador	.25	Quartz, Milky	.10
Lapis Lazuli	1.50	Quartz, Rose, deep color	.40
Lepidolite	.10	Quartz, Rose, light color	.10
Limestone	.05	Quartz, Smoky	.10
Limonite	.10	Rhodochrosite	.30
Lodestone	.10	Rhodonite	.30
Lodestone (strong)	.30	Rose Garnet in rock	.25
Lodestone (extra)	.60	Rubellite in Lepidolite	.15
Magnesite	.10	Rutile	.20
Magnetite	.10	Satin Spar	.15
Magnetite, Lodestone 10 to	.60	Selenite, N. Y.	.10
Manganite	.50	Selenite, Utah	.20
Marble	.10	Serpentine	.10
Marekanite	.25	Siderite	.10
Marcasite	.40	Soda Niter	.25
Marmolite	.25	Sphalerite	.15
Menaccanite	.25	Spodumene	.10
Meteoric Iron (shavings) per ounce	.40	Stibnite	.20
Mexican Onyx	.15	Tachydrile	.50
Molybdenite in rock	.85	Talc	.10
Muscovite	.20	Thulite	.80
Native Coke	.10	Titanite	.25
Natron	.25	Topaz	.30
Obsidian	.25	Tourmalin, Crystallized, in Matrix	.10
Ocher	.10	Tourmalin, Massive	.10
Opal, Semi-Opal	.20	Tremolite	.20
Opalized Wood	.25	Turgite	.20
Orthoclase	.10	Uintahite	.10
Perthite	.20	Wernerite	.10
Phlogopite	.15	Willemite	.50
Phosphate Nodules	.10	Witherite	.10
Prochlorite	.10	Wolframite	.60
Psilomelane	.10	Wurtzite	.75
		Zoisite, Thulite	.80

Prices are all F.O.B. Rochester, N. Y.

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Sulphuric acid 60° Be. shipped in tank cars with a capacity of 60,000 pounds.

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Carboys are charged at \$2.00 each, acid drums at \$8.00 each, aqua ammonia drums at \$10.00 each, all returnable at the same price (if in good condition), less freight to Denver or Salt Lake City.

Carboys not bearing our brand are returnable at \$1.00 each, provided both carboy and box are in good condition when received.

The Interstate Commerce Commission has designated a straight-sided fibre covered carboy for the transportation of nitric acid. Owing to the extra cost of this package, we are obliged to charge \$2.50 for all nitric acid carboys, instead of \$2.00 which we charge on other carboys.

PRICES OF CHEMICALS AND REAGENTS

FOR SALE BY

THE MINE AND SMELTER SUPPLY CO.

DENVER

SALT LAKE CITY

EL PASO

CITY OF MEXICO

COST OF BOTTLES OR OTHER CONTAINERS INCLUDED UNLESS OTHERWISE STATED

●Items marked thus (●) are so called "hazardous" chemicals and can be shipped by *all rail freight* only.

	Pound	Ounce
Acetanilid.....	\$0.50	\$0.10
●Acetone.....	.50	...
Acetone, highest purity.....	.80	.15
Acetyl Bromide.....	...	.80
Acetyl Chloride.....	...	.50
Acid Acetic, com'l, No. 8, 30% (vinegar).... bottle, \$0.09	.10	...
Acid Acetic, pure, 30%..... bottle, .09	.15	...
Acid Acetic, pure, 60%..... bottle, .09	.20	...
Acid Acetic, glacial, 80%..... bottle, .09	.25	...
Acid Acetic, chem. pure, 99½%..... bottle, .09	.35	...
Acid Acetic, anhydrous.....	1.75	.25
Acid Antimonic (antimony pentoxide) C. P.....	1.10	.20
Acid Antimonious (antimony trioxide) C. P.....	1.10	.20
Acid Arsenicic, chem. pure.....	.85	.15
Acid Arsenious, com'l, powder (arsenic trioxide).....	.15	...
Acid Arsenious, pure, lumps.....	.40	.15
Acid Arsenious, pure, powder.....	.40	.15
Acid Arsenious, chem. pure.....	.60	.15
Acid Benzoic, from gum, subl.....	1.50	.20
Acid Benzoic, from tolvane.....	.70	.10
Acid Boric, com'l, cryst.....	.25	.10
Acid Boric, com'l, powder.....	.25	.10
Acid Boric, cryst., chem. pure..... carton	.35	.10
Acid Boric, powder, chem. pure..... carton	.35	.10
Acid Boric, fused, chem. pure.....	1.50	.15
Acid Boro-Wolframic (boro-tungstic), sp. gr. 2.6.....	...	1.50
Acid Bromic, sp. gr. 1.120.....	3.50	.35
Acid Carbollic, crude, 50%..... Can \$0.15; Gal. \$0.60..	...	...
Acid Carbollic, white, cryst., pure.....	.40	...
Acid Carbollic, loose, cryst., chem. pure.....	.75	.20
Acid Carbonic, liquified, in steel cylinders of 18 pounds...	.25	...

	Pound	Ounce
Acid Carminic, chem. pure.....	...	\$3.50
Acid Chloric, 1.12 sp. gr.....	...	.30
Acid Chloroplatinic, approximately.....	grm., \$0.50	...
Acid Chromic, com'l, for batteries.....	\$0.40	...
Acid Chromic, pure, cryst.....	G. S. bottle.. .15	.70
Acid Chromic, chem. pure, cryst., free from H ₂ SO.....	G. S. bottle,.. .15	1.60
Acid Citric, cryst., purified.....	.70	.10
Acid Citric, cryst., chem. pure.....	1.20	.20
Acid Formic, pure, 1.06 (25%).....	G. S. bottle,.. .15	.60
Acid Formic, pure, 1.12 (50%).....	G. S. bottle, .15	.70
Acid Formic, pure, 1.20 (90%).....	G. S. bottle, .15	1.25
Acid Gallic, cryst., pure.....	1.00	.15
Acid Hydrobromic, sp. gr. 1.20, chem. pure ..	bottle,.. .15	1.00
Acid Hydrobromic, sp. gr. 1.49, chem. pure. bottle,	.15	2.00
Acid Hydrobromic, sp. gr. 1.78, chem. pure. bottle,	.15	5.00
Acid Hydrobromic, diluted, sp. gr. 1.077 chem. pure.....	bottle, .10	.35

"Black Labels Mean Perfection"

OUR STRICTLY CHEMICALLY PURE

ACIDS & AMMONIA

ARE GUARANTEED PERFECT

WE ALSO MANUFACTURE

COMMERCIAL SULPHURIC ACIDS
MURIATIC & NITRIC


LIQUID CARBONIC ACID GAS

ANHYDROUS & **AMMONIA**
AQUA

THE WESTERN CHEMICAL MFG. CO

DENVER, COLORADO

BUYERS OF LOW GRADE ZINC-IRON SULPHIDES



- *Acid Hydrochloric, com'l, 20° B., in 1-lb. Bottles
.....bottle, .15 .10 ...
 - *Acid Hydrochloric, com'l, 20° B., in 6-lb. Bottles
.....bottle, .25 .06 ...
 - *Acid Hydrochloric, com'l, 20°B., in carboys, carboy, 2.00 .03 ...
 - *Acid Hydrochloric, com'l, 18° B., prices on application.
- * F.O.B. Denver

	Pound	Ounce
••Acid Hydrochloric, strictly chem. pure, sp. gr. 1.20, free from As, Ch, Fe and S, in 1-lb. bottles, incl.....	\$0.35	...
••Acid Hydrochloric, strictly chem. pure, sp. gr. 1.20, free from As, Cl, Fe and S, in 6-lb. bottles, bottle included ...	.15	...
••Acid Hydrochloric, strictly chem. pure, sp. gr. 1.20, free from As, Cl, Fe and S, in carboys, carboy included].....	.12	...
Acid Hydrocyanic, diluted, U. S. P. 2% (Prussic Acid)...	.60	\$0.15
•Acid Hydrofluoric, chem. pure, in 1-lb. Ceresine bottle incl.....	1.50	.25
•Acid Hydrofluoric, chem. pure, ½-lb. Ceresine bottle incl.....	1.60	...
•Acid Hydrofluoric, chem. pure, in ¼-lb. Ceresine bottle incl	2.00	...
•Acid Hydrofluoric, com'l, in 1-lb. Ceresine bottle.....	.80	.15
•Acid Hydrofluoric, com'l, in ½-lb. Ceresine bottle	1.00	...
•Acid Hydrofluoric, com'l, in ¼-lb. Ceresine bottle	1.40	...
Acid Hydrosilicofluoric, com'l, 1.16 sp. gr....bottle, \$0.15	.50	.20
Acid Hydrosilicofluoric, chem. pure.....bottle, .15	2.00	.30
Acid Hydroiodic, 1.50 sp. gr.....	...	.50
Acid Hydroiodic, 15%.....bottle, \$0.15	1.00	.30
Acid Hypophosphorus, 30%.....	1.20	.20
Acid Iodic, cryst.....	...	.90
Acid Iodic, anhydrous.....	...	1.20
Acid Lactic, conc., pure.....	1.00	.15
Acid Malic.....	...	1.00
Acid Meconic.....	...	1.75
Acid Molybdic, chem. pure, free from ammonia.....	3.50	.40
Acid Molybdic, pure 85%.....	2.00	.25
Acid Monobromacetic.....	...	.75
Acid Monochloracetic, pure.....	2.00	.25
Acid Mucic.....	...	.50
••Acid Muriatic, Spirits of Salt. (See Acid Hydrochloric.)		
••Acid Nitric, 38° Be, in 1-lb. bottles (Aqua Fortis).....	.15	...
••Acid Nitric, com'l, 38° Be, in 7-lb. bottles...bottle, .25	.12	...
••Acid Nitric, com'l, 38° Be, in carboys.....carboy, 2.00	.10	...
••Acid Nitric, strictly chem. pure, sp. gr. 1.42, free from As, Fe, Cl, and S, in 1-lb. bottles incl.....	.35	...
••Acid Nitric, strictly chem. pure, sp. gr. 1.42, free from A s, Fe, Cl, and S, in 7-lb. bottles incl.....	.20	...
••Acid Nitric, strictly chem. pure, sp. gr. 1.42, free from As, Fe, Cl, and S, in carboys (carboys \$2.00 each).....	.14	...
••Acid Nitric, fuming, com'l, 1.60..... bottle, \$0.15	.60	...
•Acid Nitric, fuming, chem. pure, sp. gr. 1.60 bottle, .15	.80	...

*F.O.B. Denver.

	Pound	Ounce
Acid Oleic (oleinic), com'l.....bottle, \$0.09	\$0.25	...
Acid Oleic (oleinic), pure.....	.60	...
Acid Oleic (oleinic), chem. pure.....	...	\$0.50
Acid Osmic, cryst.....1-gram. vial, \$3.00		
Acid Oxalic, com'l.....	.20	.10
Acid Oxalic, chem. pure.....carton	.45	.10
Acid Palmitic, pure.....	...	.60
Acid Perchloric, pure.....	5.00	.50
Acid Phospho-Antimonic, 10% solution.....	...	.30
Acid Phospho-Molybdic, cryst.....	...	1.20
Acid Phospho-Molybdic, 10% solution.....	1.25	.25
Acid Phospho-Tungstic (phospho-wolframic), cryst.....	4.00	.45
Acid Phospho-Tungstic (phospho-wolframic), 10% solution.....	2.00	.25
•Acid Phosphoric, anhydrous (P_2O_5).....bottle, \$0.20	1.25	.25
Acid Phosphoric, glacial, in sticks (meta-).....	.80	.15
Acid Phosphoric, syrupy, 85% (ortho-).....bottle, \$0.15	.50	.15
Acid Phosphoric, diluted, 10%.....bottle, .09	.20	...
Acid Phosphoric, diluted, 50%.....bottle, .09	.35	...
Acid Phosphorus, sp. gr. 1.120.....	2.00	.30
•Acid Picric (carbazotic), pure.....	1.00	.20
•Acid Picric (carbazotic), com'l.....	.55	.10
Acid Prussic. (See Acid Hydrocyanic.)		
Acid Pyrogallic, resublimed, (Pyro), 1-lb. tin.....	2.50	.30
Acid Pyrogallic, resublimed, ½-lb. tin.....	2.70	...
Acid Pyrogallic, resublimed, ¼-lb. tin.....	3.00	...
Acid Pyroligneous, rectified.....	.40	...
Acid Pyrophosphoric.....	...	.35
Acid Rosolic.....	2.00	.30
Acid Salicylic.....carton	.60	.10
Acid Salicylous.....	..	.60
Acid Silicic, precip.....	.60	.12
Acid Silicic, chem. pure.....	.90	.15
Acid Silicic, com'l.....	.10	...
Acid Stearic, com'l.....	.40	...
Acid Stearic, chem. pure.....	...	.50
Acid Stibic, chem. pure.....	1.10	.20
Acid Stibious, chem. pure.....	1.10	.20
Acid Succinic, crude.....	...	.45
Acid Succinic, pure.....	...	.60
Acid Sulphanilic, white cryst.....	1.75	.20
Acid Sulpho-salicylic.....	...	.40
•*Acid Sulphuric, com'l, 66° B., in 1-lb. bottles, oil vitriol.....bottle, \$0.15	.10	...

* F.O.B. Denver

	Pound	Ounce
•*Acid Sulphuric, com'l, 66° B., in 9-lb. bottles, bottle, \$0.25	\$0.06	...
•*Acid Sulphuric, com'l, 66° B., in carboys .. carboy, 2.00	.03	...
•*Acid Sulphuric, com'l, 66° B., in drums of 1,600 lbs. (drums \$8.00).....	.02	...
•*Acid Sulphuric, strictly chem. pure, sp. gr. 1.845, free from As, N, SO ₂ and organic matter, in 1-lb. bottles, incl....	.35	...
•*Acid Sulphuric, strictly chem. pure, sp. gr. 1.845, free from As, N, SO ₂ and organic matter, in 9-lb. bottles, incl....	.15	...
•*Acid Sulphuric, strictly chem. pure, sp. gr. 1.845, free from As, N, SO ₂ and organic matter, in carboys, incl. ....	.10	...
•*Acid Sulphuric, anhydrous.....	1.80	...
•*Acid Sulphuric, anhydrous, in sealed glass bulbs of about 100 grammes.....	.50	...
•*Acid Sulphuric, fuming, Nordhausen bottle, \$0.15	.35	...
Acid Sulphurous, U. S. P bottle, .15	.20	...
Acid Sulphurous, chem. pure, B. & A's bottle, .15	.25	...
Acid Tannic (Tannin) carton	1.00	\$0.15
Acid Tannic, chem. pure carton	1.80	.20
Acid Tartaric, cryst.....	.50	...
Acid Tartaric, powder.....	.55	...
Acid Tartaric, chem. pure, cryst.....	.90	.15
Acid Tartaric, chem. pure, powder.....	1.00	.15
Acid Titanic.....	...	.70
Acid Trichloroacetic.....	3.50	.35
Acid Tungstic (wolframic), technical.....	1.50	.20
Acid Tungstic (wolframic), chem. pure.....	3.00	.40
Acid Uranic, pure.....	...	.75
Acid Uric, pure.....	...	.80
Acid Vanadic, chem. pure..... 1/8-oz., \$0.45	...	3.00
Acid Vanadic, technical.....	...	1.50
Acid Wolframic. (See Acid Tungstic.)		
Agar Agar, in shreds.....	1.00	...
Agar Agar, in powder.....	1.50	...
Albumen, from blood, chem. pure.....	...	.45
Albumen, from eggs, soluble, impalpable powder.....	1.60	.20
Alcohol, 95%, container extra..... pint, \$0.50	...	...
Alcohol, 95%, container extra..... quart, .90	...	...
Alcohol, 95%, container extra..... gal., 3.20	...	...
Alcohol Absolute..... pint, .80	...	...
Alcohol Absolute..... quart, 1.50	...	...
Alcohol Absolute..... gal., 5.75	...	...
Alcohol Amylic, com'l (fusel oil)..... gal., 2.50	...	...
Alcohol Amylic, chem. pure.....	1.00	...

	Pound	Ounce
Alcohol Methyl (wood alcohol), 95%, container extra	gal., \$0.80	...
Alcohol Methyl (wood alcohol), absolute, container extra	gal., 1.25	...
Alcohol Methyl (wood alcohol), deodorized (Columbian Spirits)	gal., 1.20	...
Alcohol Methyl, chem. pure.....	.00	...
Alcohol Denatured.....	gal., \$0.80	...
Formula 100 Parts Ethyl Alcohol 10 Parts Methyl Alcohol 1/2 of 1 Part Benzine	} For barrels and 1/2-barrels, special quotations.	
Aldehyde, conc.....	\$1.50	\$0.20
Alizarin, dry.....	...	.50
Alizarin, paste, 20%.....	.60	.15
Alazarin, Soda Sulfonate.....	...	.30
Alum, com'l, in lumps.....	.10	...
Alum, com'l, in powder.....	.10	...
Alum Ammoniacal, chem. pure.....	.30	...
Alum Chromic, com'l (chrome-alum).....	.15	...
Alum Chromic, com'l, powder.....	.20	...
Alum Chromic, chem. pure.....	.40	...
Alum Ferric, chem. pure.....	.50	...
Alum Potassic, chem. pure.....	.30	...
Alum Sodic, chem. pure.....	.60	...
Aluminum, metal, ingots.....	.60	...
Aluminum, metal, powder, coarse.....	1.20	.20
Aluminum, metal, powder, fine.....	1.50	.20
Aluminum, metal, sheet, up to No. 28.....	.80	.10
Aluminum, metal, sheet, No. 34.....	1.00	.15
Aluminum, metal, wire, up to No. 16.....	.80	.10
Aluminum, metal, wire, No. 20.....	.90	.15
Aluminum, metal, sheet, 1-16 inch, 99.7% pure, impurities all silicon with traces of iron.....	.80	.10
Aluminum Leaf, 5 x 5 in	small book, \$0.15	
Aluminum Acetate, chem. pure.....	1.00	.15
Aluminum Chloride, cryst., chem. pure.....	1.25	.15
Aluminum Fluoride, chem. pure, dry.....	2.00	.30
Aluminum Nitrate, cryst., chem. pure.....	1.00	.15
Aluminum Nitrate, dry, chem. pure.....	1.40	.20
Aluminum Oxide, hydrated, com'l.....	.25	.10
Aluminum Oxide, hydrated, pure.....	1.00	.15
Aluminum Oxide, hydrated, chem. pure.....	1.75	.20
Aluminum Oxide, chem. pure.....	1.80	.20

	Pound	Ounce
Aluminum Phosphate, chem. pure.....	\$1.75	\$0.20
Aluminum Silicate, pure.....	1.75	.20
Aluminum Sulphate, com'l.....	.10	...
Aluminum Sulphate, pure.....	.50	.10
Aluminum Sulphate, cryst., chem. pure.....	.90	.15
Aluminum Tartrate, chem. pure.....	2.50	.35
Aluminum Sodium Chloride, chem. pure.....	.60	.25
Amalgams. (See their respective metals.)		
Ammonia Water. (Hartshorn.) (See Ammonium Hydrate.)		
Ammonium Acetate, cryst., chem. pure.....	.80	.15
Ammonium Arsenate, chem. pure.....	1.50	.20
Ammonium Arsenite, chem. pure.....	1.40	.20
Ammonium Bicarbonate, chem. pure (sal-volatile).....	.80	.15
Ammonium Bichromate, chem, pure.....	.80	.15
Ammonium Binoxalate.....	.80	.15
Ammonium Bisulphate, pure.....	.70	.15
Ammonium Bisulphite, pure.....	2.25	.25
Ammonium Bromide.....	.50	.15
Ammonium Bromide, chem. pure.....	1.25	.20
Ammonium Carbonate, resublimed, pure, 5-lb. can.....	.25	...
Ammonium Carbonate, resublimed, powdered, 5-lb. can ..	.25	...
Ammonium Carbonate, chem. pure.....	.50	.10
Ammonium Chloride, granul., purified.....	.15	...
(Special Prices in Quantities.)		
Ammonium Chloride, lumps.....	.20	...
Ammonium Chloride, granul., pure (sal-ammoniac) ..carton	.30	.10
Ammonium Chloride, chem. pure, hydc. free.....	.50	...
Ammonium Chromate, chem. pure.....	2.00	.25
Ammonium Citrate.....	1.50	.20
Ammonium Fluoride, chem. pure.....	2.00	.25
Ammonium Formate, pure.....	...	.30
* Ammonium Hydrate (aqua ammonia) Hartshorn, conc., 26° B., in 1-lb. bottles, incl.....	.30	...
* Ammonium Hydrate (aqua ammonia), conc., 26° B., in 4-lb. bottles, incl.....	.15	...
* Ammonium Hydrate (aqua ammonia), conc., 26° B., in carboys, incl.....	.10	...
* Ammonium Hydrate, strictly chem. pure, in 1-lb. bottles, incl.....	.35	...
* Ammonium Hydrate, strictly chem. pure, in 4½-lb. bottles, incl.....	.20	...
* Ammonium Hydrate, strictly chem. pure, in carboys . . incl.	.14	...
Ammonium Hydrosulphide (solution), Mall . . bottle	\$0.15	.35
* F.O.B. Denver.		

	Pound	Ounce
Ammonium Hydrosulphide (solution), Mercks' bottle \$0.15	\$0.40	...
Ammonium Hypophosphite.....	...	\$0.25
Ammonium Hyposulphite (thiosulphate).....	1.50	.20
Ammonium Iodide.....	4.50	.45
Ammonium Molybdate, chem. pure.....	2.00	.25
Ammonium Nitrate, granul.....	.30	...
Ammonium Nitrate, cryst., chem. pure.....	.55	.15
Ammonium Nitrite, liquid.....	1.10	.20
Ammonium Oxalate, chem. pure.....	.60	.15
Ammonium Persulphate.....	1.20	.20
Ammonium Phosphate.....	.30	...
Ammonium Phosphate, pure, granular.....	.70	.10
Ammonium Phosphate, chem. pure, (dibasic).....	1.00	.20
Ammonium Phospho-Molybdate.....	...	1.00
Ammonium Picrate, pure.....	2.00	.25
Ammonium Salicylate.....	...	.20
Ammonium Succinate, cryst., pure.....	8.00	.65
Ammonium Sulphate, com'l.....	.10	...
Ammonium Sulphate, chem. pure.....	.35	.10
Ammonium Sulphide, solution..... bottle, \$0.15	.35	...
Ammonium Sulphite, cryst., chem. pure.....	1.40	.20
Ammonium Sulphocyanate, pure.....	.75	.15
Ammonium Tartrate, pure.....	1.50	.20
Ammonium Thiosulphate.....	1.50	.20
Ammonium Tungstate (Wolframate), pure.....	...	.35
Ammonium Vanadate, pure.....	...	1.10
Ammonium Sodium Phosphate, chem. pure.....	.80	.15
Ammonium Double Salts. (See under their respective metals.)		
Amyl Acetate ("pear oil"), pure.....	1.00	.20
Amyl Acetate, chem. pure.....	2.00	.40
Amyl Nitrate.....	...	.45
Amyl Nitrite.....	2.50	.30
Amylen Hydrate, pure.....	...	.60
Amylum Iodide or Iodized Starch.....	...	.35
Aniline (Aniline Oil), white, pure.....	.60	.15
Aniline Acetate.....	...	.30
Aniline Chloride.....	.50	.15
Aniline Nitrate.....	...	.25
Aniline Oxalate.....	...	.25
Aniline Sulphate.....	...	.25
Aniline Colors (coal tar dyes):		
Black, Nigrosine, soluble in water.....	1.50	.25
Black, Nigrosine, soluble in alcohol.....	2.00	.30

	Pound	Ounce
Aniline Colors (coal tar dyes):		
Blue.....		\$0.30
Blue, Methyl.....		.75
Blue, Methylene.....		.50
Blue, Pearline.....	\$1.50	.20
Brown, Bismarck.....	1.50	.30
Green, Malachite.....	1.50	.35
Green, Methyl.....		.30
Green, Brilliant.....	1.50	.30
Orange, Methyl, Indicator.....		.40
Orange, "G".....		.30
Red, Fuchsine, large cryst.....	1.60	.35
Red, Congo Red.....		.35
Red, Coraline.....		.35
Red, Eosine.....		.35
Red, Safranine.....		.35
Rose, Bengal.....		.80
Violet, Gentian.....		.35
Violet, Methyl.....		.35
Violet, Hofmann's.....		.40
Yellow, Martius'.....		.30
Anthrachinone, pure.....		.50
Antimony, metal, com'l, "Regulus".....	.35	...
Antimony, metal, com'l, powder.....	.40	...
Antimony, metal, chem. pure.....	1.50	.15
Antimony, metal, chem. pure, in sticks.....	2.00	.20
Antimony Arsenate.....		.30
Antimony Arsenite.....		.30
Antimony Chloride, cryst., pure (antimonious trichloride).....	1.50	.25
Antimony Chloride, solution (butter of anti- mony).....	Bottle, \$0.15	.30
Antimony Chloride, Antimonic (pentachloride), chem. pure.....	2.00	.30
Antimony Oxide, white.....	.60	.15
Antimony Oxide (antimonic or stibic acid) Sb_2O_5 , chem. pure.....	1.00	.20
Antimony Oxide (antimonious or stibious acid) Sb_2O_3 , chem. pure.....	1.00	.20
Antimony Oxychloride.....	1.50	.30
Antimony Sulphate, chem. pure.....	1.00	.15
Antimony Sulphide, golden (antimonic penta-sulphide)...	.50	.10
Antimony Sulphide, black (antimonious trisulphide).....	.60	.15
Antimony Sulphide, red, chem. pure.....	1.60	.20

	Pound	Ounce
Antimony Potassium Tartrate, cryst., chem. pure.....	\$0.70	\$0.15
Antimony Potassium Tartrate powder (tartar emetic)....	.50	.10
Aqua Ammonia. (See Ammonium Hydrate.)		
• Aqua Fortis. (See Nitric Acid.)		
• Aqua Regia—Nitric and Muriatic Acids.		
Argols, red powd..... 5 lbs., \$0.12	.15	...
Arsenic, metal, pure, cryst.....	.60	...
Arsenic Bromide, cryst.....	...	.35
Arsenic Chloride.....	3.00	.50
Arsenic Iodide, pure, cryst.....	..	.60
Arsenic Phosphide.....	...	1.00
Arsenic Sulphide, red powder (Realgar).....	.40	...
Arsenic Sulphide, yellow powder (Orpiment).....	.35	...
Asbestos Cement.....per 10-lb. can,	1.00	...
Asbestos Pulp.....	.10	...
Asbestos, short fibre.....	.30	...
Asbestos, long fibre, white, select.....	1.50	.15
Asbestos, washed in acid.....	2.00	...
Asbestos, washed in acid and ignited.....	2.50	.25
Asbestos, platinized, 5%.....	...	4.00
Asphaltum.....	.25	...
Azobenzole (azobenzene), pure.....	...	.50
Balsam Fir, pure (Canada Balsam).....	.75	.15
Balsam Fir, clear, filtered.....	1.50	.20
Balsam Fir, dry, hard.....	3.50	.30
Barium Acetate, chem. pure.....	.90	.20
Barium Bromide.....	...	.35
Barium Carbonate, precip.....	.20	...
Barium Carbonate, chem. pure.....	.70	.15
Barium Chlorate, chem. pure.....	.80	.15
Barium Chloride, com'l.....	.12	...
Barium Chloride, chem. pure..... carton	.30	...
Barium Chromate, chem. pure.....	.90	.20
Barium Fluoride, chem. pure.....	1.00	..20
Barium Hydrate. (See Barium Oxide.)		
Barium Hypophosphite.....	...	.40
Barium Hyposulphite (thiosulphate), chem. pure.....	...	.35
Barium Iodate.....	...	.75
Barium Iodide.....	...	.60
Barium Nitrate, cryst.....	.20	...
Barium Nitrate, powd.....	.20	...
Barium Nitrate, cryst., chem. pure.....	.40	.10
Barium Oxalate, pure.....	1.00	.15

	Pound	Ounce
Barium Oxide, hydrated (caustic), chem. pure, (baryta) . . .	\$0.60	\$0.15
Barium Oxide, hydrated (caustic), chem. pure, dry . . . . .	.80	.20
Barium Oxide, anhydrous, pure . . . . .	.60	.15
Barium Peroxide, anhydrous . . . . .	.45	.15
Barium Peroxide, anhydrous, pure . . . . .	.70	.15
Barium Phosphate, chem. pure	1.80	.25
Barium Sulphate, native (barytes) . . . . .	.10	...
Barium Sulphate, native, powder . . . . .	.10	...
Barium Sulphate, precipitated, pure . . . . .	.40	...
Barium Sulphide, com'l . . . . .	.30	...
Barium Sulphide, chem. pure . . . . .	.80	.15
Barium Sulphocyanate, pure	1.00	.15
Barium Thiosulphate, chem. pure	1.20	.25
Baryta. (See Barium Oxide.)		
Barytes. (See Barium Sulphate.)		
Bauxite . . . . .	.20	...
Benzaldehyde	1.25	.20
•Benzine (petroleum naphtha) can, \$0.20; gal., \$0.35	...	...
•Benzine, chem. pure . . . . .	.80	...
•Benzol (benzene, coal naphtha), purif., 90% . . . gal., \$1.50	.30	...
•Benzole, chem. pure, crystallizable . . . . .	.60	.15
Benzoyl Chloride, pure . . . . .	...	.40
Benzyl Chloride, pure . . . . .	...	.25
Beryllium Metal 1-10 grm., \$1.25	...	...
Beryllium Carbonate 1 grm., .20	...	...
Beryllium Chloride 1 grm., .20	...	...
Beryllium Oxide, hydrated 1 grm., .20	...	...
Beryllium Oxide, anhydrous 1 grm., .20	...	...
Beryllium Sulphate 1 grm., .20	...	...
Bismuth, metal, pure	3.00	.30
Bismuth, metal, chem. pure	4.00	.40
Bismuth Bromide . . . . .	...	.50
Bismuth Carbonate	5.00	.50
Bismuth Chloride	5.00	.50
Bismuth Iodide . . . . .	...	.60
Bismuth Nitrate, cryst	2.50	.30
Bismuth Oxide, anhydrous	5.00	.50
Bismuth Oxide, hydrated	5.00	.50
Bismuth Oxychloride	3.00	.30
Bismuth Phosphate	4.00	.40
Bismuth Subcarbonate (oxycarbonate)	3.00	.30
Bismuth Subnitrate	3.00	.25
Bismuth Sulphate	4.50	.45

	Pound	Ounce
Bismuth Tannate.....	\$3.00	\$0.30
Black Flux (Plattner's).....	1.75	.20
Blue Stone, (Blue Vitriol.) (See Copper Sulphate.)		
Bone Ash, superior quality.....	.08	...
Bone Ash.....25, 50 and 100-lb. boxes	.05	...
Bone Ash. In bbl., special rates.		
Bone Black. (See Charcoal, Animal.)		
Borax, refined, crystals.....	.10	...
Borax, refined, crystals.....25 and 50-lb. boxes	.08	...
Borax, refined, powdered.....	.10	...
Borax, refined, powdered.....25 and 50-lb. boxes	.08	...
Borax Glass, powdered.....	.20	...
Containers Included Unless Otherwise Specified.		
Borax Glass, powdered.....25 and 50-lb. boxes.	.16	...
Borax Glass, 100-lb. kegs. (Special quotations on larger quantities.)		
Brazil Wood.....	.25	...
Brimstone. (See Sulphur.)		
•Bromine.....1-lb. inc. tin and G. S. B.	1.00	.25
•Bromine..... $\frac{1}{2}$ -lb. inc. tin and G. S. B.	1.20	...
•Bromine..... $\frac{1}{4}$ -lb. inc. tin and G. S. B.	1.50	...
Bromine Chloride.....		.70
Bromoform.....		.25
Brucine, pure.....dram. \$0.25		1.80
Butter of Antimony. (See Antimony Chloride.)		
Cadmium, metal, in sticks.....	2.00	.20
Cadmium Acetate, chem. pure.....	3.00	.30
Cadmium Bromide, chem. pure.....	2.00	.25
Cadmium Carbonate, chem. pure.....	3.00	.35
Cadmium Chloride, chem. pure.....	2.50	.25
Cadmium Iodide, chem. pure.....	5.00	.50
Cadmium Nitrate, chem. pure.....	2.20	.25
Cadmium Oxide, chem. pure.....	5.00	.50
Cadmium Sulphate, chem. pure.....	2.20	.25
Cadmium Sulphide, chem. pure.....	3.50	.40
Caesium Chloride.....gram., \$0.40		...
Calcium Metal.....		.50
Calcium Acetate, crude.....	.20	...
Calcium Acetate, chem. pure.....	.65	.15
Calcium Bisulphite, solution.....	.35	...
Calcium Bromide.....	.80	.15
Calcium Carbide.....2-lb. tin, \$0.30	.30	...
.....10-lb. tin, \$1.25	...	...

100-lb. drums. Prices on application.

	Pound	Ounce
Calcium Carbonate, precipitated (chalk).....	\$0.15	...
Calcium Carbonate, chem. pure.....	.70	\$0.10
Calcium Chlorate.....	2.50	.30
Calcium Chloride, crude..... in 5-lb. tin, lb., \$0.12	.15	...
Calcium Chloride, crude, granular.. in 5-lb. tin, lb., .25	.30	...
Calcium Chloride, anhydrous, for desiccators.....	.40	...
Calcium Chloride, anhydrous, chem. pure.....	.70	...
Calcium Chloride, cryst., chem. pure.....	.40	...
Calcium Chloride, fused, gran., chem. pure.....	.60	...
Calcium Chromate, chem. pure.....	.75	.15
Calcium Cyanamide.....	.15	...
(Special Prices on Quantities.)		
Calcium Fluoride, native, powdered (Fluorspar).....	.10	...
Calcium Fluoride, chem. pure.....	1.50	.20
Calcium Formate.....	...	.20
Calcium Hydrate (lime water) prices on Application.		
Calcium Hypochlorite (Chloride of lime) 1-lb. can.....	.15	...
Calcium Hypochlorite (Chloride of lime) 10-lb. can.....	.10	...
Calcium Hypochlorite, chem. pure.....	.80	...
Calcium Hypophosphite.....	1.00	.20
Calcium Iodate.....	...	.60
Calcium Iodide.....	...	.50
Calcium Molybdate.....	3.50	.40
Calcium Nitrate, chem. pure.....	1.00	.20
Calcium Oxalate, chem. pure.....	1.50	.20
Calcium Oxide, caustic (lime).....	.10	...
Calcium Oxide, pure, from marble.....	.40	.15
Calcium Oxide, chem. pure.....	.60	.15
Calcium Phosphate, precip.....	.30	...
Calcium Phosphate, dibasic, chem. pure.....	1.00	.20
Calcium Phosphate, monobasic, pure.....	1.50	.20
Calcium Phosphate, tribasic, precip., dry.....	1.00	.15
Calcium Phosphide, chem. pure.....	2.50	.25
Calcium Phosphite, chem. pure.....	3.00	.35
Calcium Silicate, pure.....	1.00	.20
Calcium Sulphate (gypsum, plaster paris).....	.10	...
Calcium Sulphate, pure.....	.50	.15
Calcium Sulphate, chem. pure.....	.60	.15
Calcium Sulphide.....	.45	...
Calcium Sulphite, com'l.....	.25	...
Calcium Sulphite, pure.....	.50	.15
Calcium Thiosulphate.....	1.20	.20
Calomel. (See Mercurous Chloride.)		

	Pound	Ounce
Camphor, refined.....	\$1.20	...
Canada Balsam. (See Balsam Fir.)		
•Carbon Bisulphide (sulphur alcohol) in 5-lb. tin, lb., \$0.20	.25	...
•Carbon Bisulphide, pure.....	.60	\$0.15
Carbon Tetrachloride (CCl ₄).....	.40	...
Carbon Tetrachloride (CCl ₄), chem. pure.....	1.00	...
Carborundum, powder.....	.50	...
Carmine, No. 40.....	...	.50
Casein, com'l.....	.50	.10
Casein, chem. pure.....	4.00	.40
Celloidin, in shreds, for microscopic work.... box, \$1.00	...	...
Cerium, metal, pw'd.....	gm., \$4.00	...
Cerium Chloride.....	2.50	.30
Cerium Nitrate.....	2.50	.30
Cerium Oxalate.....	.60	.10
Cerium Oxide.....	3.00	.30
Cerium Sulphate (ceric).....	...	.35
Cerium Sulphate (cerous).....	...	.35
Chalk, in lumps (see Calcium Carbonate).....	.10	...
Chalk, precipitated.....	.15	...
Chalk, red (redde).....	.20	...
Chalk, French (talcum).....	.10	...
Charcoal, Animal, granu.....	.15	...
Charcoal, Animal, pow'd.....	.10	...
Charcoal, Animal, purified.....	.50	...
Charcoal, Animal, pure.....	2.25	...
Charcoal from blood, purified by acid.....	2.50	.30
Charcoal, from meat.....	3.00	.30
Charcoal, from wood, in squares, 4 x 1 inch... doz., \$0.50	...	...
Charcoal, from wood, pow'd.....	.10	...
Chloral Hydrate, cryst.....	1.60	.20
Chlorine Cubes, for generating Chlorine.....	.45	...
Chloroform, pure.....	.60	...
Chloroform, pure, Squibb's.....	1.25	...
Chlorophyll, chem. pure.....	gm., \$0.40	...
Chromium, metal.....	gm., .60	...
Chromium Metal, electrolytic.....	2.50	.25
Chromium Acetate, chem. pure.....	2.00	.25
Chromium Chloride, chem. pure, green crystals.....	1.60	.20
Chromium Chloride, subl., sesqui (Cr ₂ Cl ₆).....	...	1.00
Chromium Chloride, subl., sesqui (Cr ₂ Cl ₆), solution.....	2.00	.20
Chromium Nitrate.....	2.00	.25
Chromium Oxalate.....	1.40	.20

	Pound	Ounce
Chromium Oxide (Cr_2O_3), pure.....	\$1.00	\$0.20
Chromium Oxide, hydrated ($\text{Cr}_2(\text{OH})_6 + 4\text{H}_2\text{O}$).....	.70	.15
Chromium Sulphate.....	2.00	.25
Cinnabar, native.....	1.75	.20
Cobalt Metal, cubes, 98-99%.....	6.00	.50
Cobalt Metal, chem. pure.....	...	1.75
Cobalt Acetate, cryst.....	4.00	.40
Cobalt Arsenate, pure.....	6.00	.60
Cobalt Carbonate, pure.....	3.00	.35
Cobalt Chloride, pure.....	2.50	.30
Cobalt Chromate.....	...	.40
Cobalt Nitrate, pure.....	2.50	.30
Cobalt Oxide, com'l, "zaffre".....	.80	.10
Cobalt Oxide, black.....	4.50	.45
Cobalt Phosphate, pure.....	4.00	.40
Cobalt Sulphate, pure.....	2.00	.25
Cochineal.....	.90	.10
Cochineal, powd.....	1.00	.10
•Collodion, U. S. P.....	.90	.15
Congo Paper..... sheet, \$0.10	...	...
Copper Filings.....	.50	..
Copper Turnings.....	.40	...
Copper, metal, granular, com'l.....	.60	...
Copper, metal, granular, pure.....	1.50	...
Copper, metal, foil.....	.50	...
Copper, metal, foil, pure, Merck's, 99.95% Cu.....	1.50	.15
Copper, metal, fine powder, chem. pure.....	2.50	.30
Copper, metal, wire, pure.....	...	.10
Copper Acetate, basic (verdigris).....	.50	...
Copper Acetate, chem. pure.....	.80	.15
Copper Arsenate, chem. pure.....	1.00	.15
Copper Arsenite, chem. pure.....	2.00	.20
Copper Bichloride, pure.....	.60	.15
Copper Bromide.....	...	.40
Copper Carbonate.....	.40	...
Copper Carbonate, chem. pure.....	.70	.15
Copper Chloride, cryst., pure (bichloride) (cupric).....	.60	.15
Copper Chloride, white (monochloride) (cuprous).....	1.60	.20
Copper Chromate.....	...	.20
Copper Cyanide, chem. pure.....	1.50	.20
Copper Ferrocyanide.....	2.00	.25
Copper Iodide.....	...	.60
Copper Nitrate, cryst., chem. pure.....	.75	.15

	Pound	Ounce
Copper Nitroprussiate.....	...	\$0.50
Copper Oxide, black, com'l, pow'd.....	\$0.50	...
Copper Oxide, black, pow'd, chem. pure.....	.90	.15
Copper Oxide, black, granulated, chem. pure.....	1.20	.20
Copper Oxide, black, wire form, chem. pure.....	1.60	.20
Copper Oxide, red, pure (cuprous).....	1.50	.20
Copper Oxide, red, com'l.....	.50	.10
Copper Phosphate.....	...	.30
Copper Sulphate, cryst. (blue vitriol) (blue stone).....	.15	...
Copper Sulphate. In barrels, special quotation.		
Copper Sulphate, cryst., chem. pure.....	.50	.15
Copper Sulphate, anhydrous, chem. pure.....	1.00	.20
Copper Sulphide, pow'd.....	1.00	.15
Copper Sulphide, fused.....	.80	.15
Copper Sulphocyanate.....	2.00	.25
Copper Tannate.....	...	.25
Copper Ammonium Chloride, chem. pure.....	.60	.15
Copper Ammonium Sulphate, chem. pure.....	.60	.15
Copper Potassium Chloride, chem. pure.....	.60	.15
Copperas (Iron Sulphate, ferrous).....	.05	...
(Special Prices in Quantities.)		
Corrosive Sublimate. (See Mercury Bichloride.)		
Cotton, Absorbent.....	.50	.10
Cotton, Soluble.....	...	.40
Cream of Tartar. (See Potassium Bitartrate.)		
Creosote, from beech tar.....	1.50	.20
Cryolite, pow'd.....	.20	...
Cupric and Cuprous salts. (See Copper.)		
Curare..... grm., \$1.50	...	...
Dextrine, yellow, com'l.....	.15	...
Dextrine, white, com'l.....	.15	...
Dextrine, pure, prec. by alcohol.....	.80	.20
Dextrose (grape sugar), chem. pure.....	1.50	.20
Diamidobenzol, meta (phenylenediamine hydrochlorate)...	...	2.00
Diamond Ink, for etching on glass.....	...	.50
Diastase of Malt.....	...	1.00
Didymium, metal, pow'd..... grm., \$9.00	...	...
Didymium Carbonate..... grm., .40	...	...
Didymium Chloride..... grm., .40	...	...
Didymium Nitrate..... grm., .40	...	...
Didymium Oxide..... grm., .40	...	...
Didymium Sulphate..... grm., .40	...	...
Dimethyl-amido-azo-benzene.....	...	.90

	Pound	Ounce
Dimethylaniline, pure.....	\$1.00	\$0.15
Dimethylglyoxime..... grm., \$0.50; 1/8 oz., \$1.50	...	...
Dinitrobenzene (dinitrobenzol), com'l.....	.50	.10
Dinitrobenzene, pure.....	...	.30
Diphenylamine, cryst., chem. pure.....	...	.25
Diphenylamine Sulphate, chem. pure.....	...	.25
Diphenylamine Hydrochlorate, chem. pure.....	...	.40
Distilled Water..... gal., \$0.15	...	...
Double Salts of Nickel. (See Nickel and Ammo. Sulp.)		
Dutch Metal..... book, \$0.15	...	...
Edinol (developer).....	...	.75
Eikonogon (developer).....	...	.40
Emery, finely powdered.....	.15	...
Epsom Salts. (See Magnesium Sulphate.)		
Erbium Metal..... grm., \$7.50	...	...
Eschka Mixture.....	.80	...
Ether, Acetic (ethyl acetate).....	.80	...
Ether, Acetic, twice rectified.....	1.50	...
Ether, Acetic, anhydrous.....	2.50	...
•Ether, conc. (sulphuric), 1890..... 1-lb. cans incl.,	.45	...
•Ether, conc. (sulphuric), 1890..... 5-lb. cans incl.,	.40	...
•Ether, conc., Squibb's.....	1.00	...
•Ether, anhydrous, dist. over Sodium.....	2.00	...
Ether Petroleic (rhigolene), 25° to 45°.....	.80	...
Ethyl Iodide.....	...	.60
Eugenol.....	...	.40
Feldspar, pow'd.....	.10	...
Ferric and Ferrous Salts. (See Iron.)		
Ferromanganese, 80%.....	.30	...
Fibrin, from blood.....	...	.35
Fire Clay.....	.05	...
Fire Clay..... in 100-lb. sacks, \$1.00		
Fluorescein.....	...	.75
Fluorescin.....	...	.90
Fluorspar (calcium fluoride), pow'd.....	.10	...
(Special prices in large lots.)		
Flux, Black, Plattner's.....	1.75	.20
Flux, Black, substitute.....	.40	.10
Flux, Bismuth.....	3.00	.30
Flux, Richard's.....	.20	...
Flux, for lead assays. (See Lead Flux.)		
Formaldehyde (40%) solution..... 1-lb. bottles, incl.,	.30	...
Formaldehyde (40%) solution..... 5-lb. bottles, incl.,	.25	...

	Pound	Ounce
Fowler's Solution. (See Potassium Arsenite.)		
Fuller's Earth.....	\$0.10	...
Furfurol.....		\$0.80
Fusel Oil (alcohol amylic)..... gal., \$2.50	...	...
Gelatine, finest white, "Gold Label".....	.60	...
Glass, pow'd.....	.10	...
Glass Wool, finest grade.....	4.00	.30
Glauber Salts. (See Sodium Sulphate.)		
Glucose gal., \$1.00	.15	...
Glycerin, pure..... in 50-lb. cans, lb., \$0.30	.40	...
Glycerin, chem. pure.....	.50	...
Gold, metal, chem. pure, prec., pow'd grm., \$1.75	...	...
Gold, metal, foil and sheet grm., .85	...	24.00
Gold, metal, leaf..... book, .50	...	...
Gold Bromide..... 15 grains, 1.50	...	...
Gold Chloride..... 15 grains, .50	...	13.00
Gold Chloride and Sodium..... 15 grains, .30	...	7.00
Gold Cyanide..... 15 grains, 2.00	...	...
Grape Sugar, com'l, dry.....	.15	...
Grape Sugar, chem. pure (Dextrose).....	1.50	.20
Graphite, com'l, pow'd.....	.25	...
Graphite, pure, finely pow'd.....	.70	.15
Gum Arabic, best.....	.65	...
Gun Cotton (pyroxylin), soluble.....	...	.40
Gypsum, (See also Calcium Sulphate.).....	.10	...
Hæmatite (reddle).....	.20	...
Hæmatoxylin..... $\frac{1}{8}$ oz.,	.25	1.60
Hartshorn. (See Ammonia Water.)		
Heavy Spar (barytes).....	.10	...
Heliotropin.....	...	.50
Hæmoglobin.....	...	1.10
Hide Powder.....	2.00	...
Horn Silver. (See Silver Chloride.)		
Hydrogen Peroxide, Mallinckrodt's, U. S. P.....	.35	...
Hydrogen Peroxide, Marchand's.....	.90	...
Hydrone..... per 2-lb. tin, \$1.50	...	...
Hydroquinone.....	1.60	.20
Hypo. (See Sodium Hyposulphite.)		
Iceland Spar.....	1.00	...
Iceland Spar, pure, small crystals.....	5.00	...
Iceland Spar, pure, large crystals.....	15.00	...
Indigo.....	1.00	.15
Indigo Carmine, dry.....	...	.40

	Pound	Ounce
Indigo Solution.....	\$0.50	\$0.10
Indigotin, cryst., chem. pure..... $\frac{1}{8}$ oz., \$0.60	...	...
Indium, metal..... 15 grains, 8.00	...	...
Indium Chloride..... 15 grains, 8.00	...	...
Indium Oxide..... 15 grains, 9.00	...	...
Indium Sulphate..... 15 grains, 8.00	...	...
Infusorial Earth (Kieselguhr).....	.15	...
Iodine, resublimed, U. S. P.....	4.50	.40
Iodine Bromide.....	...	.60
Iodine Chloride, solution.....	...	.70
Iodoform.....	...	.40
Iridium, metal, fused..... gm., \$4.00	...	...
Iridium Chloride (sesqui-)..... gm., 2.00	...	...
Iridium Oxide (sesqui-)..... gm., 3.00	...	...
Iridium Sulphate..... gm., 2.50	...	...
Iron, metal, filings, coarse.....	.10	...
Iron, metal, filings, fine.....	.10	...
Iron, metal, powder, by alcohol.....	.35	.10
Iron, metal, powder, chem. pure.....	1.60	.20
Iron Wire, pure, for standardizing, in 1-oz. vials.....	...	.15
Iron, reduced by hydrogen.....	.75	.15
Iron Acetate, chem. pure.....	1.25	.20
Iron Arsenate (ferrous).....	...	.20
Iron Arsenite (ferric).....	...	.20
Iron Carbonate, precip.....	.20	...
Iron Carbonate (-ous), chem. pure.....	.40	...
Iron Chloride (ferric), cryst., pure.....	.40	.15
Iron Chloride (ferrous protochloride), pure, dry.....	.70	.15
Iron Citrate, in scales, U. S. P.....	.75	.15
Iron Ferrocyanide, blue, insoluble (Prussian blue).....	.75	.15
Iron Ferrocyanide, blue, soluble.....	.75	.15
Iron Hydrate (ferric), chem. pure.....	.75	.15
Iron Hypophosphite.....	2.25	.25
Iron Iodate.....	...	.70
Iron Iodide (ferrous).....	...	.45
Iron Malate, in scales.....	...	1.20
Iron Nitrate (ferric), cryst., pure.....	1.20	.20
Iron Oxalate (ferric), in scales.....	2.00	.25
Iron Oxalate (ferrous).....	1.50	.20
Iron Oxide, black.....	.50	.15
Iron Oxide, brown, pure.....	.70	.15
Iron Oxide (ferrous), chem. pure.....	.90	.15
Iron Oxide, red.....	.15	...

	Pound	Ounce
Iron Oxide, red, saccharated, soluble.....	\$0.60	\$0.15
Iron Oxide (ferric), chem. pure.....	1.00	.20
Iron Perchloride, cryst., pure.....	.40	.15
Iron Persulphate.....	.50	.15
Iron Phosphate (ferric), soluble.....	1.00	.15
Iron Phosphate (ferrous), precip.....	.80	.15
Iron Pyrophosphate, U. S. P.....	.70	.15
Iron Sesquichloride, cryst., pure.....	.40	.15
Iron Sulphate (ferric), normal (persulphate).....	.50	.15
Iron Sulphate (ferrous) (copperas).....	.05	...
(Special quotation in quantities.)		
Iron Sulphate (ferrous), pure, crystals. 5-lb. tin, lb., \$0.12	.15	...
Iron Sulphate (ferrous), chem. pure, precip. by alcohol.....	.50	.15
Iron Sulphide (ferrous), in lumps.....	.15	...
(Special quotations on large quantities.)		
Iron Sulphide (ferrous), in sticks.....	.20	...
Iron Sulphide (ferrous), globular.....	.20	...
Iron Sulphide (ferrous), Merck's Reagent.....	.60	...
Iron Tannate.....	2.50	.30
Iron Tartrate (ferric), in scales.....	...	.25
Iron Tartrate (ferrous).....	...	.25
Iron Trichloride, cryst., pure.....	.40	.15
Iron Ammonium Citrate, brown, scales.....	.80	.15
Iron Ammonium Oxalate, cryst.....	.90	.15
Iron Ammonium Sulphate, pure (ferrous).....	.60	.15
Iron Ammonium Sulphate, pure (ferric).....	.60	.15
Iron Potassium Oxalate, cryst.....	.80	.15
Kaolin.....	.10	...
(Special quotations in quantities.)		
Lacmoid, in scales, chem. pure.....	...	.30
Lanthanum, metal, pow'd.....	grm., \$10.00	...
Lanthanum Chloride.....	grm., .50	...
Lanthanum Nitrate.....	grm., .40	...
Lanthanum Sulphate.....	grm., .40	...
Laughing Gas. (See Nitrous Oxide.)		
Lead, metal, granulated (silver lead).....	bulk .20	...
Lead, metal, granulated (silver lead)....	.25 and 50-lb. sacks .15	...
Lead, metal, granulated, absolutely chem. pure, as manufactured by the American Smelting and Refining Co., bulk	.20	...
Lead, metal, granulated, absolutely chem. pure, as manufactured by the American Smelting and Refining Co., 25 and 50-lb. sacks.....	.15	...
NOTE:—This lead is made from absolutely chemically pure lead and guaranteed to contain not over 0.225 Troy ounces of silver, per ton of lead.		

	Pound	Ounce
Lead, metal, foil, strictly chem. pure, for standardizing....	\$0.25	\$0.10
Lead, metal, powder, chem. pure.....	1.00	.15
Lead Acetate, white (sugar of lead), com'l.....	.20	...
Lead Acetate, brown, broken.....	.15	...

In barrels, market quotation. Special prices in carloads.

Lead Acetate, chem. pure.....	carton	.40	.10
Lead Acetate, chem. pure, basic.....		.80	.15



Lead Acetate, Dr. Horne's formula.....	.60	...
Lead Bromide.....	2.00	.25
Lead Carbonate, basic, com'l (white lead).....	.15	..
Lead Carbonate, chem. pure.....	.70	.15
Lead Chloride.....	.60	...
Lead Chloride, chem. pure.....	.80	.15
Lead Chromate, chem. pure.....	1.00	.15
Lead Chromate, chem. pure, fused.....	1.10	.15
Lead Cyanide.....	...	.25
Lead Ferrocyanide.....	...	.25
Lead Hyposulphite (thiosulphate).....	.60	.10
Lead Iodide.....	...	.35
Lead Molybdate.....	...	.70
Lead Nitrate, com'l.....	.20	...
Lead Nitrate, chem. pure..... carton	.40	.10
Lead Oxalate.....	1.00	.20
Lead Oxide (litharge). (See Lead Protoxide.)		

	Pound	Ounce
Lead Oxide, chem. pure	\$1.00	\$0.20
Lead Peroxide (binoxide) . . . . .	.50	.15
Lead Peroxide, chem. pure	1.00	.20
Lead Phosphate, pure	1.50	.20
Lead Protoxide (litharge), com'l, uniform grade . . . . .	.12	...
Lead Protoxide (litharge), commercial, uniform grade, in 25 and 50-lb. kegs . . . . .	.10	...
Lead Protoxide, chem. pure. Am. Smelting and Refining Co. . . . .	.20	...
Lead Protoxide, chem. pure, in 25 and 50-lb. sacks. Am. Smelting and Refining Co. . . . .	.15	...
Lead Protoxide, anhydrous, chem. pure	1.20	.20
Lead Sesquioxide (red lead) . . . . .	.15	...
Lead Sulphate, chem. pure . . . . .	.60	.15
Lead Sulphide, pure . . . . .	.80	.15
Lead Sulphite	1.00	.15
Lead Sulphocyanate	1.50	.20
Lead Tartrate	1.50	.20
Lead Flux, No. 1, Plattner's . . . . .	.15	...
5 parts Carbonate Potash.		
6½ parts Bicarbonate Soda.		
2½ parts Flour.		
2½ parts Borax Glass, ground.		
Lead Flux, No. 2 . . . . .	.15	...
6½ parts Carbonate Potash.		
5 parts Bicarbonate Soda.		
1 part Flour.		
2½ parts Borax Glass, ground.		
Lead Flux, No. 3 . . . . .	.15	...
2 parts Carbonate Potash.		
2 parts Bicarbonate Soda.		
1 part Flour.		
1 part Borax Glass, ground.		
Lead Flux, No. 4 . . . . .	.12	...
2 parts Carbonate Potash.		
2 parts Bicarbonate Soda.		
1 part Flour.		
1 part Borax, powdered.		
Lime (calcium oxide) . . . . .	.10	...
Lime Water. (See Calcium Hydrate.)		
Lime (Vienna), lumps . . . . .	.20	...
Lime (Vienna), powder . . . . .	.25	...
Litharge. (See Lead Protoxide or Lead Oxide.)		

	Pound	Ounce
Lithium, metal..... grm., \$6.00	...	...
Lithium Acetate.....	\$2.50	\$0.30
Lithium Benzoate.....	2.00	.25
Lithium Bichromate.....	4.00	.40
Lithium Bromide.....	2.00	.25
Lithium Carbonate.....	1.50	.20
Lithium Chloride.....	2.50	.25
Lithium Citrate.....	1.50	.20
Lithium Iodide.....	5.00	.50
Lithium Nitrate.....	2.50	.25
Lithium Oxide, hydrated.....	...	.50
Lithium Phosphate.....	...	.40
Lithium Sulphate, cryst.....	...	.25
Litmus, com'l, in cubes.....	.35	.10
Litmus, Purified.....	...	.35
Litmus, red.....	...	.35
Litmus Paper..... sheet, \$0.05; quire, \$0.60	...	...
Litmus Paper..... books, \$0.05; tubes, \$0.10.	...	...
Liver of Sulphur. (See Potassium Sulphide.)		
Loadstone.....	.50	.10
Lunar Caustic. (See Silver Nitrate.)		
Lycopodium.....	1.00	.15
Magnesia Oxide, powdered (Magnesia).....	.15	...
Magnesite, native, powder.....	.15	...
Magnesium, metal, ribbon.....	...	.60
Magnesium, metal, wire.....	...	.60
Magnesium, metal, powder..... 1-lb. cans	3.50	.35
Magnesium Acetate.....	1.00	.20
Magnesium Bromide.....	3.00	.35
Magnesium Carbonate, in cubes.....	.30	...
Magnesium Carbonate, nat. powder.....	.25	...
Magnesium Carbonate, chem. pure.....	1.00	.15
Magnesium Chloride, cryst.....	.35	...
Magnesium Chloride, cryst., chem. pure.....	.40	.15
Magnesium Chloride, fused, chem. pure.....	.75	.20
Magnesium Citrate, chem. pure.....	1.40	.20
Magnesium Hypophosphite.....	2.50	.25
Magnesium Iodide.....	6.00	.60
Magnesium Nitrate, pure.....	.70	.15
Magnesium Oxide (calcined), light..... 1-lb. tin	.80	.15
Magnesium Oxide (calcined), heavy..... 1-lb. tin	.80	.15
Magnesium Oxide, chem. pure.....	1.20	.20
Magnesium Phosphate, pure.....	.70	.15

	Pound	Ounce
Magnesium Silicate (Meerschaum). Prices on application.		
Magnesium Sulphate, com'l (Epsom salt).....	\$0.10	...
Magnesium Sulphate, cryst., chem. pure..... carton	.25	...
Magnesium Sulphate, dry, chem. pure..... carton	.30	...
Magnesium Sulphite.....	.60	\$0.15
Magnesium Tartrate.....	2.50	.30
Manganese, metal, fused, pure.....	...	.60
Manganese, metal, C. free.....	2.00	...
Manganese Acetate.....	1.10	.15
Manganese Borate.....	.40	.10
Manganese Carbonate, pure.....	.75	.15
Manganese Chloride, cryst., pure.....	.50	.15
Manganese Dioxide. (See Manganese Peroxide.)		
Manganese Hypophosphite.....	...	.25
Manganese Iodide.....	...	.60
Manganese Nitrate, pure.....	1.50	.20
Manganese Oxide (manganic) (Mn_2O_3).....	4.00	.40
Manganese Peroxide, black (dioxide), natural, pow'd.....	.10	...
Manganese Peroxide, black (dioxide), natural, granular.....	.15	...
Manganese Peroxide, black (dioxide), chem. pure.....	1.00	.15
Manganese Phosphate.....	2.50	.25
Manganese Sulphate, cryst., pure.....	.60	.15
Manganese Tartrate.....	4.00	.40
Marble, pieces.....	.10	...
Meerschaum. (See Magnesium Silicate.)		
Mercury, metal (Quicksilver).....	.90	.10
Mercury, metal, flask, 75 lbs. Write for special quotations.		
Mercury, redistilled.....	1.20	.15
Mercury Acetate (mercurous).....	3.00	.30
Mercury Acetate (mercuric).....	2.50	.30
Mercury Ammonium Chloride (Mercuric) (white precipitate). Prices on application.		
Mercury Arsenate.....	...	.40
Mercury Arsenite.....	...	.40
Mercury Bichloride (corrosive sublimate), com'l.....	1.00	.15
Mercury Bichloride (corrosive sublimate), granular.....	1.10	.15
Mercury Bichloride (corrosive sublimate), pow'd.....	1.10	.15
Mercury Bichloride (corrosive sublimate), chem. pure, B. & A.	1.50	.20
Mercury Bichloride (corrosive sublimate), chem. pure, Merck's.....	1.60	.25
Mercury Bisulphate.....	1.00	.15
Mercury Chloride (mercuric). (See Mercury Bichloride.)		
Mercury Chloride (mercurous or calomel).....	1.20	.15

	Pound	Ounce
Mercury Chloride (mercurous or calomel), cryst., chem. pure.....	\$1.60	\$0.20
Mercury Chromate (mercuric).....	4.00	.40
Mercury Cyanide, pure.....	4.00	.40
Mercury Iodide, red (mercuric).....	3.50	.30
Mercury Iodide, yellow (mercurous).....	3.25	.30
Mercury Nitrate (mercuric).....	1.60	.25
Mercury Nitrate (mercurous).....	1.60	.25
Mercury Oxide (mercurous), black.....	2.50	.25
Mercury Oxide (mercuric), red (red precipitate).....	1.30	.15
Mercury Oxide (mercuric), red, chem. pure.....	1.75	.25
Mercury Oxide (mercuric), yellow, chem. pure.....	2.00	.25
Mercury Pernitrate.....	1.60	.25
Mercury Phosphate (mercuric).....	...	.45
Mercury Phosphate (mercurous).....	...	.45
Mercury Protochloride.....	1.20	.15
Mercury Sulphate, basic.....	1.50	.20
Mercury Sulphate, neutral.....	1.00	.15
Mercury Sulphate (mercuric), chem. pure.....	1.60	.20
Mercury Sulphate (mercurous), chem. pure.....	1.80	.25
Mercury Sulphide, black.....	.90	.15
Mercury Sulphide, red (mercuric), pow'd, artificial cinnabar.....	1.25	.20
Mercury Sulphide, red (mercuric), cryst., artificial cinnabar.....	1.75	.25
Mercury Sulphocyanate (mercuric).....	3.00	.30
Mercury Tannate (mercurous).....	3.00	.30
Metadiamidobenzol.....	...	.80
Metal, Wood's, fusible at 70°.....	3.50	.30
Metal, Rose's, fusible at 94°.....	3.50	.30
Methyl Acetate.....	...	.30
Methyl Iodide.....	...	.90
Methyl Orange Indicator.....	...	.50
Metol (developer).....	...	.75
Mica, ground.....	.25	...
Microcosmic Salt (sodium and ammonium phosphate) ...	.80	.15
Milk Sugar, cryst.....	.45	...
Milk Sugar, powder.....	.30	...
Minium.....	.15	...
Molybdenum, metal.....	gm., \$0.30	....
Molybdenum, metal, 95%.....	3.50	...
Molybdenum Oxide (mono-).....	...	1.10
Molybdenum Sulphide.....	...	1.20

	Pound	Ounce
Mosaic Gold. (See Tin Bisulphide.)		
Naphthaline, in flakes.....	\$0.15	...
Naphthaline, pure..... carton	.50	\$0.20
Naphthol Alpha, recryst.....	1.50	.25
Naphthol Beta, resublimed..... carton	1.25	.20
Naphthol Nitroso-Beta.....	12.00	.90
Naphthylamine, alpha, pure.....	2.50	.30
Naphthylamine, chloride, alpha.....	...	.25
Naphthylamine, sulphate, alpha.....	...	.30
Nessler's Solution.....	1.00	.20
Nickel, metal, in cubes.....	1.20	.15
Nickel, metal, chem. pure.....	...	1.00
Nickel, sheet.....	...	.20
Nickel, wire.....	...	.20
Nickel Acetate.....	1.80	.20
Nickel Carbonate.....	2.25	.20
Nickel Chloride.....	1.50	.20
Nickel Citrate.....	...	.30
Nickel Cyanide.....	...	.60
Nickel Nitrate, pure.....	1.00	.20
Nickel Oxide, black, com'l (single nickel salt).....	1.20	.20
Nickel Oxide, black, chem. pure.....	6.00	.75
Nickel Oxide, green, chem. pure.....	1.80	.20
Nickel Phosphate.....	...	.35
Nickel Sulphate, com'l.....	.40	...
Nickel Sulphate, chem. pure.....	2.00	.25
Nickel Ammonium Chloride.....	1.00	.20
Nickel Ammonium Sulphate (double nickel salt for electro- plating).....	.25	...
Nickel and Ammonium Sulphate, chem. pure.....	.75	.15
Nitre. (See Potassium Nitrate.)		
Nitre Cake. (See Sodium Bisulphate.)		
Nitrobenzol (oil mirbane).....	.30	...
Nitronaphthalene.....	.75	...
Nitrous Oxide. (Laughing gas.) Prices on application.		
Nitrosobetanaphtol.....	12.00	.90
Nutgalls.....	.50	...
Nutgalls, pow'd.....	.60	...
Oil Aniline, pure.....	.60	.15
Oil Bergamot.....	6.00	.50
Oil Cedar.....	1.20	.20
Oil Cloves.....	1.60	.20
Oil Fusel..... gal., \$2.50	...	...

		Pound	Ounce
Oil Lard, for blow pipe lamps	gal., \$1.50	...	...
Oil Linseed	gal., 1.40	...	...
Oil Olive	gal., 2.50	...	...
Oil Origanum			\$0.40
•Oil Turpentine	gal. (7-lbs.), 1.40	\$0.25	...
•Oil Turpentine, redistilled . . . . .		.60	...
•Oil Vitriol. (See Sulphuric Acid.)			
Orpiment, powder . . . . .		.35	...
Oxone	per 2-lb. tin, 1.50	...	...
Ozokerite . . . . .		.30	...
Palladium, metal	grm., 1.60	...	...
Palladium, metal, black (Mohr)	grm., 1.75	...	...
Palladium Asbestos, 5%	grm., .50	...	...
Palladium Chloride, cryst.	grm., 2.00	...	...
Paraffine, pure . . . . .		.20	...
Paraldehyde		1.20	.20
Paris Green . . . . .		.50	...
Pearl Ash (potassium carbonate) . . . . .		.15	...
Peptone, dry, Witte's	100 grm., 1.10	...	...
Petrolatum . . . . .		.25	...
Phenacetolin Indicator	1/8-oz., .20	...	1.20
Phenolphthalein, pure		4.50	.40
Phenylenediamine Meta Hydrochlorate (metadiamido- benzol) . . . . .		...	.80
Phenylhydrazine, pure		4.00	.40
Phenylhydrazine Hydrochlorate		4.00	.40
Phloroglucin	grm., .25	...	3.50
•Phosphorus, red, amorphous		1.75	.25
•Phosphorus, yellow, in sticks	1-lb. cans	1.00	...
•Phosphorus, yellow, in sticks	1/2-lb. cans	1.20	...
•Phosphorus, yellow, in sticks	1/4-lb. cans	1.40	...
•Phosphorus, yellow, in sticks	1-oz. cans	...	.20
•Phosphorus, yellow, in sticks, thin, for gas analysis		2.50	.30
•Phosphorus Oxychloride		3.00	.35
•Phosphorus Pentachloride		1.50	.30
•Phosphorus Pentoxide (acid phosphoric, anhydride)	bottle, .20	1.25	.25
•Phosphorus Trichloride		1.50	.30
Pipe Clay . . . . .		.10	...
Plaster Paris (calcium sulphate), com'l . . . . .		.10	...
Platinum, metal, foil and wire		market price.	
Platinum, metal, manufactured utensils. (See Apparatus list.)			
Platinum, metal, sponges		market price.	

	Pound	Ounce
Platinum Bichloride (platinic chloride), cryst., chem. pure..	market price.	
Platinum Bichloride (platinic chloride).....	market price.	
Platinum Bichloride, 5% solution.....	market price.	
Platinum Hydrogen Chloride (chlor. platinic acid).....	market price.	
Platinum Potassium Chloride.....	market price.	
(All other Platinum compounds to order at lowest prices.)		
Plumbago. (See Graphite.)		
•Potassium, metal .....net, incl. tin and vial	...	\$1.35
•Potassium, metal.....in 1/2-oz.	...	1.50
•Potassium, metal.....in 1/4-oz.	...	1.60
•Potassium, metal.....in 1/8-oz.	...	2.00
Potassium Acetate.....	\$0.50	.15
Potassium Acetate, chem. pure.....	.80	.15
Potassium Antimoniate.....	1.00	.15
Potassium Antimoniate, pure.....	2.00	.25
Potassium Arsenate, pure.....	1.00	.15
Potassium Arsenite, pure (solution of, called Fowler's sol.)..	1.00	.10
Potassium Bicarbonate, cryst.....	.20	...
Potassium Bicarbonate, pow'd.....	.20	...
Potassium Bicarbonate, chem. pure.....	.40	.10
Potassium Bichromate, com'l, cryst.....	.20	...
Potassium Bichromate, com'l, pow'd.....	.30	...
Potassium Bichromate, chem. pure carton	.60	.10
Potassium Bincoxalate (salt of sorrel).....	.30	...
Potassium Bincoxalate, chem. pure.....	.60	.15
Potassium Bisulphate, cryst., chem. pure.....	.50	.15
Potassium Bisulphate, fused, chem. pure.....	.65	.15
Potassium Bisulphite, chem. pure.....	.75	.15
Potassium Bitartrate, com'l (argols).....	.15	...
Potassium Bitartrate, powder, white (cream of tartar).....	.40	...
Potassium Bitartrate, chem. pure.....	.80	.15
Potassium Borotartrate.....	...	.25
Potassium Bromate, chem. pure.....	2.50	.30
Potassium Bromide.....	.40	.10
Potassium Bromide, chem. pure.....	1.00	.15
Potassium Carbonate, gran. (pearl ash).....	.15	...
Potassium Carbonate, gran. (pearl ash) in cans of 70 lbs..	.11	...
Potassium Carbonate, gran. In bbls., special quotation.		
Potassium Carbonate, chem. pure.....	.50	.15
Potassium Carbonate, chem. pure, pow'd.....	.60	.15
Potassium Caustic. (See Potassium Hydrate.)		
Potassium Hydrate, white, purified, in sticks.....	.40	.15

	Pound	Ounce
Potassium Hydrate, pure, by alcohol, in sticks.....	\$0.60	\$0.15
Potassium Hydrate, com'l..... 10-lb. tins, lb. \$0.12	.15	...
Potassium Hydrate, strictly chem. pure.....	1.50	.20
Potassium Chlorate, cryst.....	.20	...
(Special quotation in quantities 112-lb. Kegs.)		
Potassium Chlorate, powder.....	.20	...
Potassium Chlorate, granular, pure.....	.40	...
Potassium Chlorate, cryst., chem. pure..... carton	.45	.10
Potassium Chlorate, pow'd, chem. pure..... carton	.45	.10
Potassium Chloride, pure.....	.25	...
Potassium Chloride, chem. pure..... carton	.40	.10
Potassium Chloroplatinite, approximately.....	...	20.00
Potassium Chromate, com'l.....	.35	...
Potassium Chromate, chem. pure..... carton	.60	.15
Potassium Citrate.....	.80	.15
Potassium Citrate, chem. pure.....	1.20	.20
Potassium Cobaltic Nitrite.....	...	1.00
Potassium Cyanate, pure.....	...	1.00
Potassium Cyanide, fused, white (for mining), 30%..... 1-lb. can	.40	.10
Potassium Cyanide, fused, white, 30%..... 10-lb. can	.30	...
Potassium Cyanide, granular, 98%.....	.70	...
Potassium Cyanide, chem. pure (domestic) 98 to 100%..... 1-lb. can	.50	...
Potassium Cyanide, chem. pure (domestic) 98 to 100%..... 10-lb. can	.40	...
Potassium Cyanide, chem. pure. In 100-lb. or 200-lb. cans, special price.		
Potassium Cyanide, chem. pure, Merck's, 98 to 100%..... 1-lb. can	.50	.15
Potassium Cyanide, chem. pure, absolutely.....	3.50	.40
Potassium Ferricyanide (red prussiate of potash).....	.70	.10
Potassium Ferricyanide, chem. pure.....	1.00	.15
Potassium Ferrocyanide (yellow prussiate of potash).....	.30	.10
Potassium Ferrocyanide, chem. pure.....	.60	.15
Potassium Fluoride, chem. pure.....	1.30	.20
Potassium Formate, chem. pure.....	2.50	.25
Potassium Hydroxide. (See Potassium Hydrate.)		
Potassium Hypophosphite, pure.....	1.50	.20
Potassium Hyposulphite (thiosulphate), pure.....	1.50	.20
Potassium Iodate.....	5.00	.50
Potassium Iodide, pure.....	3.00	.30
Potassium Iodide, chem. pure.....	4.00	.40
Potassium Manganate, chem. pure.....	.65	.15

	Pound	Ounce
Potassium Metabisulphite.....	\$0.80	\$0.15
Potassium Molybdate.....	...	.50
Potassium Nitrate, cryst (nitre).....	.12	...
(Special quotation in barrel lots.)		
Potassium Nitrate, granul (Saltpetre).....	.12	...
(Special quotation in barrel lots.)		
Potassium Nitrate, cryst., chem. pure.....	.40	.15
Potassium Nitrate, powder, chem. pure..... carton	.40	.10
Potassium Nitrite, pure.....	.65	.15
Potassium Nitrite, in sticks, chem. pure.....	1.25	.20
Potassium Nitroprusside.....	...	.80
Potassium Oxalate, neutral, pure.....	.30	...
Potassium Oxalate, chem. pure.....	.60	.15
Potassium Perchlorate, chem. pure.....	1.50	.20
Potassium Permanganate, small crystals.....	.25	...
Potassium Permanganate, cryst., pure..... carton	.35	.10
Potassium Permanganate, chem. pure.....	.70	.15
Potassium Persulphate.....	2.00	.20
Potassium Phosphate, chem. pure, monobasic.....	1.00	.15
Potassium Phosphate, chem. pure, dibasic.....	1.00	.15
Potassium Silicate Solution (water glass).....	.40	.10
Potassium Silicate, dry, chem. pure.....	1.50	.20
Potassium Silico Fluoride, pure.....	2.00	.25
Potassium Stannate, pure.....	2.50	.30
Potassium Sulphate.....	.15	...
Potassium Sulphate, chem. pure..... carton	.35	.10
Potassium Sulphide, fused (liver of sulphur).....	.30	...
Potassium Sulphide, chem. pure.....	.80	.15
Potassium Sulphite.....	.60	.15
Potassium Sulphite, chem. pure.....	1.00	.20
Potassium Sulphocarbonate.....	.70	.15
Potassium Sulphocyanate, chem. pure.....	1.00	.15
Potassium Tartrate, chem. pure.....	.90	.15
Potassium Tetra-Oxalate.....	1.20	.20
Prussic Acid. (See Acid Hydrocyanic.)		
Prussian Blue. (See Iron Ferrocyanide.)		
Pumice Stone, lumps.....	.12	...
Pumice Stone, powder.....	.10	...
Putty Powder (tin oxide, gray).....	.75	.10
Pyroxelyn (gun cotton).....	...	.40
Pyro. (See Acid Pyrogallic.)		
Quartz, powdered.....	.10	...
Quicksilver. (See Mercury.)		

	Pound	Ounce
Raffinose .....	...	\$2.50
Realgar, powder (arsenic sulphide)	\$0.40	...
Red Lead. (lead sesqui oxide.) .....		...
Red Precipitate. (See Mercury Oxide, Red.)		
Reddle, in sticks, for marking crucibles, etc .....	.20	...
Resorcin.....	1.60	.20
Rhodol — A Photographic Developer—		
1-lb. lots.....	5.50	...
½-lb. lots.....	5.75	...
¼-lb. lots.....	6.00	...
Per ounce.....		.45
Rochelle Salt (sodium and potassium tartrate), pow'd....	.35	.10
Rosaniline, pure.....		.40
Rosaniline Acetate.....		.40
Rosaniline Hydrochloride.....		.40
Rosin.....	.10	...
Rubidium, metal, pure..... 1-10 grm., \$1.50		...
Rubidium Carbonate..... grm., .20		...
Rubidium Iodide..... grm., .20		...
Rubidium Sulphate..... grm., .20		...
Ruthenium, metal..... grm., 6.00		...
Ruthenium Chloride, cryst..... grm., 2.50		...
Ruthenium Oxychloride..... 1½ grain, 1.75		...
Saccharin (Garantose).....		.30
Sal Ammoniac in lumps (ammonium chloride or muriate). .20		...
Sal Ammoniac, granular, white, special prices in quantities .15		...
Sal Soda (Sodium carbonate crystal)..... .05		...
(Special prices in quantities.)		
Sal Volatile. (See Ammonium Bicarbonate.)		
Salt, in sacks (Sodium Chloride).....	.03	...
Salt Cake. (See Sodium Sulphate.)		
Saltpetre (Potassium Nitrate.).....	.12	...
Sea Sand.....	.10	...
Sealing Wax, best, red, extra No. 6.....	.25	...
Selenium, metal, pure, in sticks.....		1.80
Shellac, orange.....	.70	...
Silica, powdered, com'l.....	.04	...
(Special prices in quantities.)		
Silicon, metal, cryst..... grm., \$0.30		...
Silicon, metal, amorphous..... ½-oz., .40		2.00
Silicon Chloride-tetra..... per 10-grm. tube, .80		...
Silver, metal, foil, chem. pure.....		1.25
Silver, metal, precipitated.....		2.00

	Pound	Ounce
Silver, metal, leaf.....per book, \$0.15	...	...
Silver, metal, granulated, chem. pure.....	...	\$1.00
Silver Acetate.....	...	1.60
Silver Bromide.....	...	1.40
Silver Carbonate.....	...	1.50
Silver Chloride (Horn Silver).....	...	1.00
Silver Cyanide.....	...	1.25
Silver Iodide.....	...	1.25
Silver Nitrate, pure, cryst., Mall (Lunar Caustic).....	\$8.00	.65
Silver Nitrate, chem. pure.....	10.00	.80
Silver Nitrate, Merck's Reagent.....	18.00	1.25
Silver Nitrite.....	...	1.80
Silver Oxide.....	...	1.50
Silver Phosphate.....	...	2.00
Silver Sulphate.....	...	1.25
Soda Ash (sodium carbonate). (Special prices in quantities.)	.10	...
Soda Caustic, in drums.....	.05	...
Soda Lime, granul.....	.55	.15
•Sodium, metal..... tin	1.00	.30
•Sodium, metal..... in $\frac{1}{2}$ lb.	1.20	...
•Sodium, metal..... in $\frac{1}{4}$ lb.	1.40	...
Sodium Acetate, pure, granular.....	.20	...
Sodium Acetate, chem. pure, cryst.....	.40	.15
Sodium Acetate, chem. pure, fused.....	.60	.15
Sodium Amalgam.....	1.50	.20
Sodium Arsenate.....	.25	...
Sodium Arsenate, pure.....	.60	.15
Sodium Arsenite.....	.25	...
Sodium Arsenite, pure.....	.80	.15
Sodium Biborate. (See Borax.)		
Sodium Biborate, cryst., chem. pure.....	.50	.15
Sodium Biborate, pow'd, chem. pure.....	.50	.15
Sodium Bicarbonate, com'l.....	.05	...
Sodium Bicarbonate..... in 112-lb. kegs	.03	...
Sodium Bicarbonate, com'l..... in barrels of 400-lbs. (Special quotation.)		
Sodium Bicarbonate, cryst., chem. pure..... carton	.25	.10
Sodium Bicarbonate, pow'd, chem. pure..... carton	.25	.10
Sodium Bichromate, com'l.....	.20	...
Sodium Bichromate, chem. pure.....	.55	.15
Sodium Bismuthate.....	...	.40
Sodium Bisulphate, cryst., chem. pure (nitre-cake).....	.50	.15
Sodium Bisulphate, fused, chem. pure.....	.60	.15
Sodium Bisulphite, dry, com'l.....	.30	.15

	Pound	Ounce
Sodium Bisulphite, dry, pure.....	\$0.40	\$0.15
Sodium Bitartrate.....	1.10	.20
Sodium Borate. (See Borax.)		
Sodium Bromate.....	1.40	.20
Sodium Bromide.....	.50	.15
Sodium Carbonate, cryst. (sal soda) (soda ash).....	.05	...
(Special quotation in barrels.)		
Sodium Carbonate, pure, cryst 1-lb. can	.20	...
Sodium Carbonate, pure, cryst 5-lb. can	.15	...
Sodium Carbonate, dry, for assaying.....	.20	...
Sodium Carbonate, dry, for assaying... in kegs of 130 lbs.	.10	...
Sodium Carbonate, calcined, for assaying, in kegs of 100 lbs.	.08	...
Sodium Carbonate, cryst., chem. pure bottle	.40	.15
Sodium Carbonate, anhydrous, chem. pure carton	.30	.10
Sodium Caustic. (See Sodium Hydrate.)		
Sodium Chlorate, pure, granular.....	.40	...
Sodium Chlorate, chem. pure.....	.60	.15
Sodium Chloride, cryst., chem. pure carton	.30	.10
Sodium Chloride, com'l (salt).....	.03	...
Sodium Chloride, fused, chem. pure.....	.70	.15
Sodium Chromate, chem. pure.....	1.00	.15
Sodium Citrate.....	.90	.15
Sodium Cyanide..... 1-lb. bottle	.65	...
Sodium Cyanide 10-lb. tin	.50	...
Sodium Ferrocyanide, pure.....	.90	.15
Sodium Fluoride, pure.....	.90	.15
Sodium Formate, pure.....	1.20	.20
Sodium Hydrate, 98%, granular 10-lb. can	.12	...
(Special quotations on larger quantities.)		
Sodium Hydrate, white, purified, in sticks.....	.40	.15
Sodium Hydrate, pure, by alcohol, in sticks.....	.60	.15
Sodium Hydrate, from sodium, chem. pure.....	2.00	.25
Sodium Hydrate, with Lime (soda lime), granul.....	.55	.15
Sodium Hypophosphite.....	1.10	.20
Sodium Hyposulphate.....	...	.50
Sodium Hyposulphite (thiosulphate), cryst. or granular (Hypo).....	.08	...
Sodium Hyposulphite, cryst. or granular ... in 100-lb. keg	.04½	...
Sodium Hyposulphite, chem. pure in bottle	.35	.15
Sodium Hyposulphite, chem. pure..... in carton	.25	.10
Sodium Iodate.....	6.00	.65
Sodium Iodide.....	4.00	.40
Sodium Metaphosphate.....	...	.20

	Pound	Ounce
Sodium Methylate, dry pure .....	...	\$0.80
Sodium Molybdate	\$4.00	.40
Sodium Nitrate, granul., com'l .....	.10	...
Sodium Nitrate, chem. pure .....	.40	.15
Sodium Nitrite, com'l .....	.25	...
Sodium Nitrite, cryst., chem. pure .....	.50	.15
Sodium Nitrite, in sticks, chem. pure .....	.90	.15
Sodium Nitroprussiate .....	...	.60
Sodium Oleate	1.00	.20
Sodium Oxalate, "Sörensen," Merck's Reagent .....	...	.40
Sodium Permanganate .....	.50	...
• Sodium Peroxide	1-lb. can 1.00	...
• Sodium Peroxide	10-lb. can .80	...
• Sodium Peroxide, chem. pure	1.25	...
• Sodium Peroxide, free from Carbon, for Calorimeter	1.80	...
Sodium Phosphate (di-sodic phosphate) .....	.20	...
Sodium Phosphate, cryst., chem. pure .....	.35	.15
Sodium Phosphate, dry, chem. pure .....	.60	.15
Sodium Phosphate, tribasic, chem. pure	1.00	.15
Sodium Phosphite .....	...	.40
Sodium Phosphomolybdate .....	...	.75
Sodium Phosphotungstate .....	...	.60
Sodium Plumbate	1.20	.20
Sodium Pyrophosphate, cryst., pure .....	.60	.15
Sodium Selenate .....	...	2.50
Sodium Silicate, dry .....	.15	...
Sodium Silicate, solution (water glass)	bottle, \$0.10 .10	...
Sodium Silicate, cryst., pure	1.00	.15
Sodium Silico Fluoride	1.00	.15
Sodium Stannate, pure .....	.80	.15
Sodium Sulphate, com'l (Glauber salts) (salt cake) .....	.10	...
Sodium Sulphate, cryst., chem. pure .....	.35	.15
Sodium Sulphate, dry, chem. pure	carton .35	.10
Sodium Sulphide, cryst	in 400-lb. bbl. .05	...
Sodium Sulphide, cryst., pure .....	.50	.15
Sodium Sulphide, fused, com'l .....	.40	.15
Sodium Sulphide, fused, pure .....	.70	.15
Sodium Sulphite, cryst	1-lb. can .15	...
Sodium Sulphite, cryst	5-lb. can .12	...
Sodium Sulphite, recryst., pure .....	.35	...
Sodium Sulphite, dry, powder	1-lb. can .20	...
Sodium Sulphite, dry powder	5-lb. box .15	...
Sodium Sulphite, cryst., pure	bottle .35	.15

	Pound	Ounce
Sodium Sulphite, dry, pure carton	\$0.35	\$0.10
Sodium Sulphocyanate, cryst., pure . . . . .	...	.25
Sodium Tartrate, cryst., pure . . . . .	.80	.15
Sodium Tungstate	1.50	.20
Sodium Uranate (uranium yellow) . . . . .	...	.60
Sodium Urate . . . . .	...	.60
Sodium Xanthogenate . . . . .	...	.25
Sodium Ammon. Phosphate (microcosmic salt), chem. pure . . . . .	.80	.15
Sodium Potassium Tartrate, cryst. (Rochelle salts) . . . . .	.40	...
Sodium Potassium Tartrate, pow'd (Rochelle salts) . . . . .	.40	...
Sodium Potassium Tartrate, chem. pure . . . . .	.60	.15
Spirits of Salt. (See Acid Muriatic.)		
Sponges, for laboratory use lb.	\$0.50 to \$2.50	...
Stannum. (See Tin.)		
Starch . . . . .	.15	...
Starch, Iodized . . . . .	...	.35
Starch, Potato . . . . .	.25	...
Starch, Soluble, Zulkowsky's . . . . .	...	.50
Starch, Soluble, Merck's	1.25	.25
Starch, Wheat . . . . .	.25	...
Stearine . . . . .	.30	...
Steel Wool . . . . .	.50	...
Stibium. (See Antimony.)		
Strontium, metal, from amalgam 1-10 grm., \$0.75	...	...
Strontium, metal, by electrolysis 1-10 grm., 1.50	...	...
Strontium Acetate	1.60	.20
Strontium Carbonate, com'l . . . . .	.30	.10
Strontium Carbonate, chem. pure . . . . .	.60	.15
Strontium Chloride, com'l . . . . .	.30	.10
Strontium Chloride, chem. pure . . . . .	.60	.15
Strontium Chromate . . . . .	...	.25
Strontium Nitrate, com'l . . . . .	.20	...
Strontium Nitrate, chem. pure . . . . .	.60	.15
Strontium Oxide, hydrated, cryst., pure	1.00	.15
Strontium Oxide, chem. pure	2.00	.25
Strontium Sulphate, chem. pure . . . . .	.60	.15
Sugar of Lead. (See Lead Acetate.)		
Sulphur, in rolls (brimstone) . . . . .	.08	...
(Special price in quantities.)		
Sulphur Flour, sublimed (flowers of sulphur) . . . . .	.08	...
Sulphur, precipitated, pure . . . . .	.30	...
Sulphur, cryst . . . . .	.40	.10
Sulphur, cryst., pure . . . . .	.75	.15

	Pound	Ounce
•Sulphur Chloride.	\$0.75	\$0.15
Sulphur Dioxide, in 20-oz. tins tin, \$0.60	...	...
Sulphur Dioxide, in 70 -oz. valve top tins tin, 4.00	...	...
Tannin. (See Acid Tannic.)		
Talcum Powder. ....	.10	...
Tartar Emetic. (See Antimony and Potassium Tartaric.)		
Tellurium, metal, powder grm., \$0.50	...	...
Tellurium, metal, in sticks grm., .50	...	...
Terra Alba. ....	.10	...
Test Papers, blue and red litmus and turmeric;		
In small books. each, \$0.05; doz.,	\$0.50	...
In sheets. each, .05; quire, .60	...	...
Thallium, metal grm., .20	...	...
Thallium Acetate grm., .35	...	...
Thallium Bromide grm., .35	...	...
Thallium Carbonate grm., .35	...	...
Thallium Chloride grm., .30	...	...
Thallium Iodide grm., .50	...	...
Thallium Nitrate grm., .25	...	...
Thallium Oxide (thallic) grm., .30	*	...
Thallium Oxide (thallous) grm., .30	...	...
Thallium Sulphate grm., .25	...	...
Thorium, metal 1-10 grm., 2.50	...	...
Thorium Oxide. ....	...	2.00
Thorium Nitrate. ....	...	.70
Thorium Sulphate. ....	...	1.80
Thymol, pure.	3.00	.30
Thymol Iodide (Aristol).	6.00	.60
Tin, metal, in bars. ....	.80	.10
Tin, metal, foil, s. c. tobacco foil. ....	.25	...
Tin, metal, foil, thin tissue. ....	.50	...
Tin, metal, foil, pure. ....	.75	.10
Tin, metal, granulated, com'l (mossy). ....	.75	.10
Tin, metal, granulated, pure. ....	.90	.10
Tin, metal, granulated, fine, pure.	1.25	.15
Tin, metal, powdered, pure.	1.00	.15
Tin, metal, in sticks, pure. ....	.75	.10
Tin Bichloride (fuming tetrachloride). tin and g. s. b.	2.00	.40
Tin Bisulphide (Mosaic Gold) prices on application.		
Tin Chloride (stannous chloride) protochloride, chem. pure	.80	.15
Tin Chloride (stannic chloride), chem. pure. ....	.75	.15
Tin Oxide, white (stannic). ....	.90	.15
Tin Oxide, white, pure (stannic).	1.10	.15

	Pound	Ounce
Tin Oxide, gray (putty powder).....	\$0.60	\$0.15
Tin Oxide, black (stannous),pure.....	1.50	.20
Tin Sulphate (stannous).....	1.25	.20
Tin Sulphide (stannous).....	1.50	.20
Titanium, metal, powder..... grm., \$0.80	...	...
Titanium Chloride..... grm., .25	...	...
Titanium Oxide.....	...	.80
Toluidine (ortho).....	...	.20
Toluidine (ortho), pure.....	...	.60
Toluidine (para).....	...	.20
Toluidine (para), pure.....	...	.25
Toluidine Sulphate.....	...	.40
•Toluol (toluene), com'l.....	.35	...
•Toluol (toluene), pure.....	.60	.15
Tripoli, powder.....	.15	...
Tropaeolin "OO" or "OOO".....	...	.30
Tungsten, metal (wolfram), com'l.....	1.50	.15
Tungsten, chem. pure.....	...	.80
Turmeric Powder.....	.25	...
Turmeric Paper..... sheet, \$0.05; quire, \$0.60	...	...
Uranium, metal, fused..... grm., .70	...	...
Uranium Acetate.....	6.00	.60
Uranium Acetate, chem. pure, free from sodium.....	9.00	.90
Uranium Nitrate, chem. pure.....	5.50	.50
Uranium Oxide, black, pure.....	...	.80
Uranium Oxide, red (uranic acid), pure.....	...	.80
Uranium Oxide, yellow (sodium uranate).....	...	.60
Uranium Sulphate.....	...	.60
Urea, cryst., pure (carbamide).....	3.50	.35
Urea Nitrate.....	3.50	.35
Urea Sulphate.....	...	.60
Vanadium, metal, pow'd..... grm., \$3.50	...	...
Vanadium Sulphide..... grm., .40	...	...
Vanillin.....	...	.75
Vaseline, yellow..... incl. can	.30	...
Vaseline, white..... incl. can	.60	...
Verdigris. (See Copper Acetate.)		
Vienna Lime, lumps.....	.20	...
Vienna Lime, powder.....	.25	...
Vinegar. (See Acid Acetic.)		
Water Glass. (See Potassium Silicate or Sodium Silicate.)		
Wax, yellow.....	.50	.10
Wax, white.....	.70	.10

	Pound	Ounce
White Lead. (See Lead Carbonate.)		
White Precipitate. (See Mercuric Ammonium Chloride.)		
White Vitriol. (See Zinc Sulphate.)		
White Zinc. (See Zinc Oxide.)		
Whiting.....	\$0.10	...
Wolfram, metal. (See Tungsten.)		
Wood Alcohol. (See Alcohol Methylic.)		
•Xylol (xylene), pure.....	.60	\$0.15
Yttrium, metal, powder..... grm., \$7.50	...	...
Yttrium Carbonate..... grm., 1.00	...	...
Yttrium Nitrate..... grm., .50	...	...
Yttrium Oxide, anhydrous..... grm., .40	...	...
Zinc, metal (spelter), in slabs.....	.15	...
Zinc, metal, shavings.....	.25	...
(Special prices in quantities.)		
Zinc, metal, sheet.....	.15	...
Zinc, metal, sheet, cut in strips.....	.25	...
Zinc, metal, sheet, chem. pure.....	.50	...
Zinc, metal, in sticks, chem. pure.....	.50	.10
Zinc, metal, in sticks, pure, absolutely free from As.....	.40	.10
Zinc, metal, granulated (mossy).....	.25	...
Zinc, metal, granulated (mossy), pure.....	.40	.10
Zinc, metal, granulated, Merck's, chem. pure.....	.55	.10
Zinc, metal, powdered (dust).....	.30	...
Zinc, metal, powdered (dust), in 35-lb. tin.....	.25	...
Zinc, metal, powdered, chem. pure (coarse).....	.55	.10
Zinc, metal, powdered, chem. pure, 20 mesh.....	.50	.10
Zinc, metal, powdered, chem. pure, 30 mesh.....	.45	.10
Zinc, metal, shot, chem. pure.....	.40	.10
Zinc Acetate, cryst., pure.....	.50	.15
Zinc Carbonate, com'l, for electroplating.....	.20	...
Zinc Carbonate, precip.....	.30	.10
Zinc Carbonate, precip., pure.....	.60	.15
Zinc Chloride, com'l.....	.30	.10
Zinc Chloride, granul., pure.....	.40	.15
Zinc Chloride, fused, pure.....	.60	.15
Zinc Cyanide, pure.....	...	.25
Zinc Iodide.....	...	.50
Zinc Nitrate, pure.....	.75	.15
Zinc Oxide, by wet process, chem. pure (white zinc). carton	.40	.10
Zinc Oxide, chem. pure, free from Mn.....	.50	.15
Zinc Oxide, by dry process.....	.20	...
Zinc Phosphate, chem. pure.....	1.25	.20

	Pound	Ounce
•Zinc Phosphide.....	...	\$0.30
Zinc Sulphate (white vitriol), com'l.....	\$0.10	...
Zinc Sulphate, cryst., chem. pure..... carton	.25	.10
Zinc Sulphide, pure.....	1.50	.20
Zinc Sulphite.....	...	.20
Zinc Potassium Cyanide.....	2.00	.20
Zirconium, metal..... grm., \$0.60	...	...
Zirconium Nitrate, cryst.....	...	.80
Zirconium Oxide, anhydrous.....	...	1.40
Zirconium Sulphate.....	...	.70

USEFUL INFORMATION

HELP IN CASE OF ACCIDENTS

Drowning. 1. Loosen clothing, if any.

2. Empty lungs of water by laying body on its stomach, and lifting it by the middle so that the head hangs down. Jerk the body a few times.

3. Pull tongue forward, using handkerchief, or pin with string, if necessary.

4. Imitate motion of respiration by alternately compressing and expanding the lower ribs, about twenty times a minute. Alternately raising and lowering the arms from the sides up above the head will stimulate the action of the lungs. Let it be done gently but persistently.

5. Apply warmth and friction to extremities.

6. By holding tongue forward, closing the nostrils, and pressing the "Adam's apple" back (so as to close entrance to stomach), direct inflation may be tried. Take a deep breath and breathe it forcibly into the mouth of patient, compress the chest to expel the air, and repeat the operation.

7. **DON'T GIVE UP!** People have been saved after hours of patient, vigorous effort.

8. When breathing begins, get patient into a warm bed, give warm drinks, or spirits in teaspoonfuls, fresh air and quiet.

Burns and Scalds. Cover with cooking soda and lay wet cloths over it. Whites of eggs and olive oil. Olive oil or linseed oil, plain, or mixed with chalk or whiting. Sweet or olive oil and lime water.

Lightning. Dash cold water over a person struck.

Sunstroke. Loosen clothing. Get patient into shade and apply ice-cold water to head. Keep head in elevated position.

Mad Dog or Snake Bite. Tie cord tight above wound. Suck the wound and cauterize with caustic or white-hot iron at once, or cut out adjoining parts with a sharp knife. Give stimulants, as whiskey, brandy, etc.

Stings of Venomous Insects, etc. Apply weak ammonia, oil, salt water, or iodine.

Fainting. Place flat on back; allow fresh air and sprinkle with water. Place head lower than rest of body.

Tests of Death. Hold mirror to mouth. If living, moisture will gather. Push pin into flesh. If dead, the hole will remain, if alive, it will close up. Place fingers in front of a strong light, if alive, they will appear red; if dead, black or dark. If a person is dead decomposition is almost sure to set in.

ANTIDOTES FOR POISONS

FIRST.—Send for a physician.

SECOND.—Induce vomiting, by tickling throat with feather or finger; drinking hot water or strong mustard and water. Swallow sweet oil or whites of eggs.

Acids are antidotes for ALKALIES, and vice versa.

Acids—Muriatic, Oxalic, Acetic, Sulphuric (Oil of Vitriol), Nitric, (Aqua Fortis). Soap-suds, magnesia, lime-water.

Prussic Acid. Ammonia in water; dash water in face; give solution cobalt nitrate.

Carbolic Acid. Flour and water, mucilaginous drinks.

Alkalies—Potash, Lye, Hartshorn, Ammonia. Use vinegar or lemon juice in water.

Arsenic—Rat Poison, Paris Green. Use milk, raw eggs, sweet oil, lime-water, flour and water.

Bug Poison—Lead, Saltpetre, Corrosive Sublimate, Sugar of Lead, Blue Vitriol. Use white of eggs or milk in large quantities.

Chloroform—Chloral, Ether. Dash cold water on head and chest; artificial respiration.

Carbonate of Soda—Copperas, Cobalt. Use soap-suds and mucilaginous drinks.

Iodine—Antimony, Tartar Emetic. Use starch and water astringent infusions; strong tea.

Mercury and its Salts. Use whites of eggs, milk mucilages.

Opium—Morphine, Laudanum, Paregoric, Soothing Powders or Syrups. Use strong coffee, hot bath; keep awake and moving at any cost.

ANTIDOTES FOR CYANIDE POISONING

All Cyanides are deadly poisons, but the aqueous solutions used in practice are so dilute that there is little or no danger from the prussic acid evolved from them if the buildings are properly ventilated.

Acids react on Cyanides, liberating Prussic Acid gas, which causes almost instant death when inhaled in a pure state. When diluted with air, it causes faintness, dizziness and a depressing frontal headache.

Even very dilute solutions of Cyanide are poisonous when taken internally, and, when they come in contact with the skin, produce in some persons an eruption of painful red boils. In cases where the hands and arms must be brought into contact with the solutions, rubber gloves, reaching over the elbows, should be provided for the workmen. Kaffir workmen are said to suffer no inconvenience whatsoever from the contact of their skin with Cyanide solutions.

If the poisoning is the result of inhaling Prussic Acid gas, it is advisable to make the patient inhale a small quantity of chlorine gas, ammonia or ether. The chlorine gas can be quickly made and applied by sprinkling a little bleaching powder on a piece of flannel moistened with Acetic Acid, and then holding the flannel to the nostrils of the patient.

Emergency Treatment In Cyanide Poisoning

This remedy consists, first of $7\frac{1}{2}$ grms. of Ferrous Sulphate, dissolved in 30 cc. of water; second, $1\frac{1}{2}$ grms. of Caustic Soda dissolved in 300 cc. of water; third, two grms. of magnesia. The first and second are to be kept in hermetically sealed bottles.

These three remedies, with a rubber stomach tube and a mouth gag, should be kept in a tin case 5 inches in diameter, and 7 inches high. There should also be a filtering shelf of finely perforated metal. The case serves as a vessel for the mixture for its ready use, and its cases should be in numerous handy places.

Everything Depends Upon Prompt Action

The bottles containing the antidotes can be broken over the filter shelf and emptied into the tin case, the shelf excluding any broken glass. The magnesia is added and the mixture given the patient as soon as possible. If already unconscious, the gag is put in the mouth, the stomach tube inserted and the mixture poured into the stomach.

Before or after the dose the stomach tube may be inserted and about half a pint of water poured down and then syphoned out by lowering the end of the tube. The stomach should be thoroughly washed out and vomiting induced either by mustard or by tickling the throat with a feather, should the tube not be at hand.

As soon as the antidote has been given and the tube withdrawn artificial respiration should be resorted to as much as in the case of partial drowning or suffocation.

For skin trouble, cuts and bruises, bathe with hydrogen peroxide, and cover with vaseline.

USEFUL INFORMATION

DOMESTIC POSTAGE

FIRST-CLASS MATTER (Letters, etc.)	2c. an oz.
SECOND-CLASS (Newspapers and Periodicals)	1c. for 4 oz.
THIRD-CLASS (Books and Circulars)	1c. for 2 oz.
FOURTH-CLASS (Merchandise)	1c. an oz.
REGISTRATION FEE (additional postage)	10c.
SPECIAL DELIVERY (additional to regular postage)	10c.
MONEY ORDER (\$1 to \$100)	3c. to 30c.

(See below for Explanations and Exceptions.)

First-Class Matter.—Letters and all other written matter (whether sealed or not), excepting manuscript copy accompanying proof-sheets, also all matter sealed (see below), 2 cents an ounce, excepting drop letters at Non-Carrier offices, 1 cent an ounce. Postal Cards, 1 cent each. Post Cards (private mailing cards), 1 cent each.

Second-Class.—Newspapers and periodicals, published quarterly and oftener, and not for gratuitous distribution. The general public pay by affixing stamps at the rate of 1 cent for each 4 ounces or part thereof, when not sealed.

Third-Class.—Books (printed, not blank), circulars, other printed matter, proof-sheets and manuscript copy accompanying same, valentines, sheet-music, photographs, heliotypes, chromos, posters, lithographs and printed advertising matter on paper only — all, when not sealed, 1 cent for 2 ounces or fraction. Limit of weight, 4 pounds.

Fourth-Class.—Merchandise and samples, blank books and paper; ores; all matter not included in any of the other classes, and not in its nature perishable or liable to injure the contents of the mails. (By express ruling the postage on seeds, cuttings, roots, scions, and plants is at the rate of 1 cent for each 2 ounces.) All, when not sealed, and not exceeding 4 pounds in weight, 1 cent an ounce, or fraction.

Third and fourth-class mail matter may now be forwarded without postage stamps affixed in lots of two thousand or more identical pieces; certain regulations are to be complied with, and postage prepaid in cash.

Sealing.—Any matter is regarded as sealed when it is not so wrapped as to allow of a thorough examination without in any way injuring the wrapping.

Registration.—All classes of mail matter may be registered at any post-office by affixing 8 cents in stamps in addition to the regular postage.

MONEY ORDER RATES

Sums not exceeding \$2.50	3c.
Over \$ 2.50 and not exceeding \$ 5.00	5c
Over \$ 5.00 and not exceeding \$ 10.00	10c.
Over \$10.00 and not exceeding \$ 20.00	10c.
Over \$20.00 and not exceeding \$ 30.00	12c.
Over \$30.00 and not exceeding \$ 40.00	15c.
Over \$40.00 and not exceeding \$ 50.00	18c.
Over \$50.00 and not exceeding \$ 60.00	20c.
Over \$60.00 and not exceeding \$ 75.00	25c.
Over \$75.00 and not exceeding \$100.00	30c.

Postage to Canada, Cuba, Panama, and Mexico.—Mail matter of all kinds addressed for delivery in Canada, Cuba, Panama, and Mexico is admitted to the mails at domestic postage rates and conditions, except commercial papers and bona fide trade samples, which are admitted at a rate of 2 ounces for 1 cent, if not weighing over 12 ounces. Minimum charge on commercial papers 5 cents, minimum charge on samples 2 cents. Seeds, bulbs, scions, and plants for Canada must be prepaid at a rate of 1 cent per ounce, or fraction of an ounce; and packages of salable merchandise for Mexico should be sent by parcels post. Limit of weight of second and third-class matter to Mexico is 4 pounds 6 ounces. Newspapers, except dailies, mailed to Canada by publishers must bear stamps affixed, 1 cent for 4 ounces.

Postage to Porto Rico, Philippines, Guam, etc.—Same as domestic.

FOREIGN POSTAGE

The rates to foreign countries (except Canada, Cuba, Panama, and Mexico, and letter rates to Great Britain, Ireland, and Germany) are as follows: Letters, 5 cents for first ounce or fraction, and 3 cents for each additional ounce or fraction; printed matter, per 2 ounces, 1 cent; postal cards, 2 cents each. Letter rates to Great Britain and Ireland, and to Germany direct, 2 cents an ounce.

USEFUL INFORMATION

THE RURAL FREE DELIVERY SYSTEM

Is gradually being extended to every part of the United States, especially in territory surrounding large cities.

Each person desiring rural free delivery service must erect, at his own cost, a box approved by the Postmaster-General.

More than one family, but not more than five, may be permitted to use the same box, provided that written notice of agreement to that effect, signed by the head of each family, is filed with the postmaster at the distributing office.

PARCELS POST

Parcels may now be sent to and from the United States, Porto Rico, the Philippines, Guam, and the Canal Zone by mail to the following countries, provided the greatest length of the package does not exceed 3 feet 6 inches, and the greatest length and girth combined does not exceed 6 feet; greatest weight allowable, 11 pounds.

¹Austria.

Bahamas.

Barbados.

Chile.

¹Colombia.

Jamaica, including the Turks and Caicos Islands.

Leeward Islands (Antigua with Barbuda; Redonda, St. Kitts, Nevis with Anguilla, Dominica, Monserrat, and the Virgin Island).

²¹Mexico.

³The Netherlands.

Salvador.

Uruguay.

Windward Islands (Grenada, St. Vincent, the Grenadines, and St. Lucia).

Newfoundland.

Honduras (Republic of).

Trinidad, including Tobago.

Ecuador.

Germany.

Guatemala.

New Zealand, including Fanning Island.

Venezuela.

³Hong Kong and some other cities in China.

³Japan, including Korea and Formosa.

³Norway.

Peru.

³Australia.

¹Costa Rica.

The Danish West Indies.

France.

Honduras (British).

⁴Italy.

British Guiana.

Bermuda.

³Denmark.

Nicaragua.

Bolivia.

³Belgium.

Great Britain.

³Sweden.

Postage for a parcel not exceeding 1 lb., 12c., and 12c. for every additional pound or fraction thereof in all cases, except Chile, Ecuador, and Bolivia, in which cases it is 20c. per lb. and 20c. and for every additional lb. or fraction thereof.

¹Greatest length, 2 ft.; greatest girth (length and girth combined not considered), 4 ft.

²Weight limited to 4 lbs. 6 ozs.; 11 lbs. accepted in some of the larger places.

³Greatest weight, 4 lbs. 6 ozs., and must not exceed in value \$50 each.

⁴Must not exceed in value \$50.

WEIGHTS AND MEASURES

SQUARE MEASURE, U. S. STANDARD

Inches.	Foot.	Yard.	Perch.	Rod.	Acre.
144 =	1.				
1296 =	9.	1.			
39204 =	272.25 =	30.25 =	1		
1568160 =	10890.	= 1210.	= 40	= 1	
6272640 =	43560.	= 4840.	= 160	= 4	= 1

An acre is 69.5701 yards square; or 208.710321 feet square.

SQUARE MEASURE, METRIC

	Sq. Metres.	U. S. Sq. In.	Sq. Feet.	Sq. Yards.	Acres.
1 Sq. Centimetre... =	.0001 =	.155			
1 Sq. Decimetre... =	.01 =	15.5	.10764 =	.01196	
1 Centiare... =	1.	1550.03	10.764 =	1.196	.00024
1 Are... =	100.	= 155003.	= 1076.4	= 119.6	= .0247
1 Hectare... =	10000.	=	= 107641.	= 11960.	= 2.47

LIQUID OR WINE MEASURE, METRIC

In the Metric system the liquid and dry measures are the same.

	Litres.	U. S. Cu. Ins.	U. S.
1 Millilitre... =	.001 =	.061 =	.00845 gill.
1 Centilitre... =	.01 =	.61 =	.0845 gill.
1 Decilitre... =	.1 =	6.1 =	.845 gill = .2113 pints.
1 Litre... =	1.	= 61.02 =	2.113 pints = 1.056 quarts.
1 Decalitre... =	10.	= 610.16 =	2.641 gallons.
	U. S. Cu. Ft.		
1 Hectolitre... =	100.	= 3.531 =	26.417 gallons.
1 Kilolitre... =	1000.	= 35.31 =	264.17 gallons.
1 Myrialitre... =	10000.	= 353.1 =	2641.7 gallons.

LIQUID MEASURE, APOTHECARY

Gallon.	Pints.	Ounces.	Drams.	Mins.	Cu. Ins.	Grains of Water.	Cu. C. M.
=	8 =	128 =	1024 =	61440 =	231.	= 58328.886	= 3785.00
	1 =	16 =	128 =	7680 =	28.875	= 7291.1107	= 473.11
		1 =	16 =	480 =	1.8047 =	455.6944	= 29.57
			1 =	60 =	0.2256 =	56.9618	= 3.70

LIQUID MEASURE

4 gills	1 pint	
8 gills or 2 pints	1 quart	
32 gills or 8 pints or 4 quarts		1 gallon
31½ gallons		1 barrel
2 barrels or 63 gallons		1 hoghead

TABLE TO CONVERT U. S. LIQUID MEASURE INTO METRIC LIQUID MEASURE

As one U. S. liquid ounce is equal to 29.572 cubic centimeters and one pint is equal to 0.4731 litres, to convert:

Pints into litres	multiply by	0.4731
Fluid ounces into cubic centimeters	multiply by	29.572

TABLE TO CONVERT METRIC LIQUID MEASURE INTO U. S. LIQUID MEASURE

As one Litre, or 1000 cc., is equal to 33.8149 fluid ounces, to convert:

Litres into fluid ounces	multiply by	33.815
Cubic centimeters into fluid ounces	multiply by	0.0338
Litres into pints	multiply by	2.113

WEIGHTS AND MEASURES

COMPARISONS AND EQUIVALENTS

Troy Weight

For weighing precious metals, such as Gold, Platinum, Silver, etc., Troy weights are used exclusively.

The U. S. Standard Troy pound, was copied in 1827 from the imperial Troy pound of England for the use of the United States Mint, and there deposited. It is standard in air at 62° Fahr., the barometer at 30 inches.

24 grains = 1 pwt.

480 grains = 20 pwt. = 1 oz.

5760 grains = 240 pwt. = 12 oz. = 1 lb. = 22.816 cub. in. of distilled water at 62° Fahr.

Avoirdupois Weight.

For weighing base metals such as Lead, Antimony, Tin, etc., and the weight in general use in trade and commerce in the U. S.

1 drachm = 27.34375 grains Troy.

16 drachm = 1 oz = 437.5 grains Troy.

256 drachm = 16 oz = 1 lb = 1.2153 lb. Troy.

6400 drachm = 400 oz = 25 lb = 1 quarter.

25600 drachm = 1600 oz = 100 lb = 4 quarter = 1 cwt.

512000 drachm = 32000 oz = 2000 lb = 80 quarter = 20 cwt. = 1 ton.

Apothecaries' Weight

20 grains = 1 scruple.

60 grains = 3 scruple = 1 drachm.

480 grains = 24 scruple = 8 drachm = 1 oz.

5760 grains = 288 scruple = 96 drachm = 12 oz. = 1 lb.

TABLE TO CONVERT AVOIRDUPOIS AND TROY WEIGHTS INTO METRIC WEIGHTS

As one grain is equal to 0.0648 and one avoirdupois ounce is equal to 28.3495 grammes, and one Troy ounce is equal to 31.1035 grammes, to convert:

Grains into grammes.....	multiply by	0.0648
Grains into centigrammes.....	multiply by	6.4799
Grains into milligrammes.....	multiply by	64.799
Avoirdupois ounces into kilogrammes.....	multiply by	0.02835
Avoirdupois ounces into grammes.....	multiply by	28.3495
Avoirdupois pounds into kilogrammes.....	multiply by	0.4536
Troy ounces into kilogrammes.....	multiply by	0.0311
Troy ounces into grammes.....	multiply by	31.1035

Metric or French Weights

	Grammes.	Troy grs.				
1 Milligrm... =	.001 =	.01543				
1 Centigrm... =	.01 =	.15432	Troy			
1 Decigrm... =	.1 =	1.5432	ozs.	lbs.	ozs.	Avoir. lbs.
1 Gramme... =	1.	= 15.432	= .032 =	.00267 =	.03528 =	.0022047
1 Decagrm... =	10.	=	.321 =	.02679 =	.3528 =	.022046
1 Hectogrm... =	100.	=	3.215 =	.26792 =	3.52758 =	.22046
1 Kilogrm... =	1000.	=	32.150 =	2.6792 =	35.2758 =	2.2046
1 Myriagrm... =	10000.	=		26.792 =		22.046
1 Qumtal... =	100000.	=		267.92 =		220.46
1 Tonneau... =	1000000.	=		2679.2 =		2204.6

The unit of the metric system is the gramme = 15.438395 Troy grains, or the weight of 1 cc. of distilled water at 4° C.

WEIGHTS AND MEASURES

TABLE TO CONVERT METRIC WEIGHTS INTO AVOIRDUPOIS AND TROY WEIGHTS

As one gramme is equal to 15,432×grains, or .03527 Avoirdupois ounce, or .03215 Troy ounce, to convert:

Grammes into grains.....	multiply by	15.432
Centigrammes into grains.....	multiply by	0.15432
Milligrammes into grains.....	multiply by	0.01543
Kilogrammes into Avoirdupois ounces.....	multiply by	35.2739
Grammes into Avoirdupois ounces.....	multiply by	.03527
Kilogrammes into Avoirdupois pounds.....	multiply by	2.2046
Kilogrammes into Troy ounces.....	multiply by	32.1507
Grammes into Troy ounces.....	multiply by	.03215

LINEAR MEASURE, U. S. STANDARD

The standard unit of the United States and British linear measure is the yard. It was intended to be exactly the same for both countries, but in reality the United States yard exceeds the British standard by .00087 inch. The actual standard of length for the United States is a brass scale 82 inches long prepared for the Coast Survey and deposited in the office of weights and measures at the U. S. Treasury Department, Washington. The yard is between the 27th and 63d inches of this scale. The temperature at which this scale is designed to be standard, and at which it is used in the U. S. Coast Survey, is 62° Fahrenheit.

Inches	Foot	Yard	Fathom	Perch	Furlong	Mile
12 =	1.					
36 =	3.	= 1.				
72 =	6.	= 2.	= 1.			
198 =	16.5	= 5.5	= 2.75	= 1		
7920 =	660.	= 220.	= 110.	= 40	= 1	
63360 =	5280.	= 1760.	= 880.	= 320	= 8	= 1 League
190080 =	15840.	= 5280.	= 2640.	= 960	= 24	= 3 = 1

LINEAR MEASURE, METRIC

	Metre	U. S. Ins.	Feet	Yards.	Miles.
1 Millimetre.....	= .001	= .03937	= .00328		
1 Centimetre.....	= .01	= .3937	= .0328		
1 Decimetre.....	= .1	= 3.937	= .32808	= .10936	
1 Metre.....	= 1.	= 39.3704	= 3.2808	= 1.0936	
1 Decametre.....	= 10.	= 393.704	= 32.808	= 10.936	
1 Hectometre.....	= 100.	= 3937.04	= 328.08	= 109.36	= .0621375
1 Kilometre.....	= 1000.	= 3937.04	= 3280.8	= 1093.6	= .621375
1 Myriametre.....	= 10000.	= 39370.4	= 32808.	= 10936.	= 6.21375

TABLE TO CONVERT U. S. LINEAR MEASURE INTO METRIC LINEAR MEASURE

As one inch is equal to 0.0254 meters to; convert:

Inches into meters.....	multiply by	0.0254
Inches into centimeters.....	multiply by	2.5399
Inches into millimeters.....	multiply by	25.3997

CUBIC MEASURE, METRIC

	Cu. Metres.	U. S. Cu. Ins.	U. S. Cu. Ft.	U. S. Cu. Yds.
1 Cubic Centimetre.....	= .000001	= .061025		
1 Cubic Decimetre.....	= .001	= 61.025		
1 Centistere.....	= .01	= 610.25	= .353156	
1 Decistere.....	= .1	= 6102.5	= 3.53156	= .13080
1 Stere.....	= 1.	= 61.025	= 35.3156	= 1.3080
1 Decastere.....	= 10.	= 610.25	= 353.156	= 13.080
1 Hectostere.....	= 100.	= 6102.5	= 3531.56	= 130.80

REFERENCE TABLES

METRIC CONVERSION TABLE

Millimeters.....	×	.03937	= Inches	
Millimeters.....	=	25.400	×	Inches
Meters.....	×	3.2809	= Feet	
Meters.....	=	.3048	×	Feet
Kilometers.....	×	.621377	= Miles	
Kilometers.....	=	1.6093	×	Miles
Square centimeters.....	×	.15500	= Square inches	
Square centimeters.....	=	6.4515	×	Square inches
Square meters.....	×	10.76410	= Square feet	
Square meters.....	=	.09290	×	Square feet
Square kilometers.....	×	247.1098	= Acres	
Square kilometers.....	=	.00405	×	Acres
Hectares.....	×	2.471	= Acres	
Hectares.....	=	.4047	×	Acres
Cubic centimeters.....	×	.061025	= Cubic inches	
Cubic centimeters.....	=	16.3866	×	Cubic inches
Cubic meters.....	×	35.3156	= Cubic feet	
Cubic meters.....	=	.02832	×	Cubic feet
Cubic meters.....	×	1.308	= Cubic yards	
Cubic meters.....	=	.765	×	Cubic yards
Litres.....	×	61.023	= Cubic inches	
Litres.....	=	.01639	×	Cubic inches
Litres.....	×	.26418	= U. S. gallons	
Litres.....	=	3.7854	×	U. S. gallons
Grams.....	×	15.4324	= Grains	
Grams.....	=	.0648	×	Grains
Grams.....	×	.03527	= Ounces, av' dupois	
Grams.....	=	28.3495	×	Ounces, av' dupois
Kilograms.....	×	2.2046	= Pounds	
Kilograms.....	=	.4536	×	Pounds
Kilog's per sq. centimeter.....	×	14.2231	= Lbs. per sq. inch	
Kilog's per sq. centimeter.....	=	.0703	×	Lbs. per sq. inch
Kilogram per cubic meter.....	×	.06243	= Lbs. per cubic foot	
Kilogram per cubic meter.....	=	16.01890	×	Lbs. per cubic foot
Metric tons (1,000 kilog's).....	×	1.1023	= Tons (2,000 lbs.)	
Metric tons (1,000 kilog's).....	=	.9072	×	Tons (2,000 lbs.)
Kilowatts.....	×	1.3405	= Horse-powers	
Kilowatts.....	=	.746	×	Horse-powers
Calories.....	×	3.9683	= B. T. units	
Calories.....	=	.2520	×	B. T. units
Francs.....	×	.193	= Dollars	
Francs.....	=	5.18	×	Dollars

REFERENCE TABLES

FRACTIONAL PARTS OF AN INCH EXPRESSED IN THOUSANDTHS

The following tables will be found very convenient for the transposition of fractional parts of an inch, or decimal parts of a millimeter to decimals of an inch:

Eighths	Thirty-seconds	Sixty-fourths	Sixty-fourths
$\frac{1}{8}$ = .125	$\frac{1}{32}$ = .03125	$\frac{1}{64}$ = .015625	$\frac{33}{64}$ = .515625
$\frac{1}{4}$ = .250	$\frac{3}{32}$ = .09375	$\frac{2}{64}$ = .046875	$\frac{35}{64}$ = .546875
$\frac{3}{8}$ = .375	$\frac{5}{32}$ = .15625	$\frac{3}{64}$ = .078125	$\frac{37}{64}$ = .578125
$\frac{1}{2}$ = .500	$\frac{7}{32}$ = .21875	$\frac{4}{64}$ = .109375	$\frac{39}{64}$ = .609375
$\frac{5}{8}$ = .625	$\frac{9}{32}$ = .28125	$\frac{5}{64}$ = .140625	$\frac{41}{64}$ = .640625
$\frac{3}{4}$ = .750	$\frac{11}{32}$ = .34375	$\frac{6}{64}$ = .171875	$\frac{43}{64}$ = .671875
$\frac{7}{8}$ = .875	$\frac{13}{32}$ = .40625	$\frac{7}{64}$ = .203125	$\frac{45}{64}$ = .703125
Sixteenths	$\frac{15}{32}$ = .46875	$\frac{8}{64}$ = .234375	$\frac{47}{64}$ = .734375
	$\frac{17}{32}$ = .53125	$\frac{9}{64}$ = .265625	$\frac{49}{64}$ = .765625
	$\frac{19}{32}$ = .59375	$\frac{10}{64}$ = .296875	$\frac{51}{64}$ = .796875
	$\frac{21}{32}$ = .65625	$\frac{11}{64}$ = .328125	$\frac{53}{64}$ = .828125
	$\frac{23}{32}$ = .71875	$\frac{12}{64}$ = .359375	$\frac{55}{64}$ = .859375
	$\frac{25}{32}$ = .78125	$\frac{13}{64}$ = .390625	$\frac{57}{64}$ = .890625
	$\frac{27}{32}$ = .84375	$\frac{14}{64}$ = .421875	$\frac{59}{64}$ = .921875
	$\frac{29}{32}$ = .90625	$\frac{15}{64}$ = .453125	$\frac{61}{64}$ = .953125
	$\frac{31}{32}$ = .96875	$\frac{16}{64}$ = .484375	$\frac{63}{64}$ = .984375
$\frac{1}{16}$ = .0625			
$\frac{3}{16}$ = .1875			
$\frac{5}{16}$ = .3125			
$\frac{7}{16}$ = .4375			
$\frac{9}{16}$ = .5625			
$\frac{11}{16}$ = .6875			
$\frac{13}{16}$ = .8125			
$\frac{15}{16}$ = .9375			

DECIMAL PARTS OF A MILLIMETER EXPRESSED IN DECIMAL PARTS
OF AN INCH

MM	Inches	MM	Inches	MM	Inches	MM	Inches	MM	Inches
1	.03937	80	.0314960	60	.0236220	40	.0157480	20	.0078740
.99	.0389765	79	.0311023	59	.0232283	39	.0153543	19	.0074803
.98	.0385826	78	.0307086	58	.0228346	38	.0149606	18	.0070866
.97	.0381889	77	.0303149	57	.0224409	37	.0145669	17	.0066929
.96	.0377952	76	.0299212	56	.0220472	36	.0141732	16	.0062992
.95	.0374015	75	.0295275	55	.0216535	35	.0137795	15	.0059055
.94	.0370078	74	.0291338	54	.0212598	34	.0133858	14	.0055118
.93	.0366141	73	.0287401	53	.0208661	33	.0129921	13	.0051181
.92	.0362204	72	.0283464	52	.0204724	32	.0125984	12	.0047244
.91	.0358267	71	.0279527	51	.0200787	31	.0122047	11	.0043307
.90	.0354330	70	.0275590	50	.0196850	30	.0118110	10	.0039370
.89	.0350393	69	.0271653	49	.0192913	29	.0114173	9	.0035433
.88	.0346456	68	.0267716	48	.0188976	28	.0110236	8	.0031496
.87	.0342519	67	.0263779	47	.0185039	27	.0106299	7	.0027559
.86	.0338582	66	.0259842	46	.0181102	26	.0102362	6	.0023622
.85	.0334645	65	.0255905	45	.0177165	25	.0098425	5	.0019685
.84	.0330708	64	.0251968	44	.0173228	24	.0094488	4	.0015748
.83	.0326771	63	.0248031	43	.0169291	23	.0090551	3	.0011811
.82	.0322834	62	.0244094	42	.0165354	22	.0086614	2	.0007874
.81	.0318897	61	.0240157	41	.0161417	21	.0082677	1	.0003937

FOREIGN MONEYS AND U. S. EQUIVALENTS

Great Britain and British Colonies

1 Penny = 2 cents. 1 Shilling = 24 cents. 1 Pound = \$4.80.

\$ c	£ s d	\$ c	£ s d	\$ c	£ s d
.05	2½	1.25	5.2½	5.00	1.0.10
.10	5	1.50	6.3	10.00	2.1.8
.25	1.½	1.75	7.3½	15.00	3.2.6
.50	2.1	2.00	8.4	20.00	4.3.4
.75	3.1½	3.00	12.6	25.00	5.4.2
1.00	4.2	4.00	16.8	50.00	10.8.4

Germany

1 Pfennig = .238 cent. 10 Pfennigs = 2.38 cents. 1 Mark = 23.8 cents.
\$1.00 = 4.20 Marks.

France, Belgium and Switzerland

1 Centime = .193 cent. 10 Centimes = 1.93 cents. 1 Franc = 19.3 cents.
\$1.00 = 5.18 Francs.

Russia

1 Ruble = 51.5 cents.
\$1.00 = 1.94 Rubles.

Sweden, Norway and Denmark

1 Krona = 26.8 cents.
\$1.00 = 3.73 Kronor.

Spain (gold)

1 Peseta = 19.3 cents.
\$1.00 = 5.18 Pesetas (gold).

Italy

1 Lira = 19.3 cents.
\$1.00 = 5.18 Lire.

Greece

1 Drachma = 19.3 cents.
\$1.00 = 5.18 Drachmas.

Austria-Hungary

1 Heller = .203 cent. 10 Heller = 2.03 cents. 1 Krone = 20.3 cents.
\$1.00 = 4.925 Kronen.

Netherlands

1 Florin = 40.2 cents.
\$1.00 = 2.48 Florins.

Japan

1 Yen = 49.8 cents.
\$1.00 = 2 Yen.

COMMON CHEMICALS

CORRECT NAMES FOR SOME OF THE MORE COMMON CHEMICALS

Aqua Fortis.....	Nitric Acid
Aqua Regia.....	Nitric and Muriatic Acids
Baryta.....	Barium Oxide
Barytes.....	Barium Sulphate
Blue Stone, Blue Vitriol.....	Copper Sulphate
Borax.....	Sodium Borate
Brimstone.....	Sulphur
Butter of Antimony.....	Antimonious Chloride
Calomel.....	Mercurous Chloride
Chalk.....	Calcium Carbonate
Copperas, Green Vitriol.....	Iron Sulphate
Corrosive Sublimate.....	Mercuric Chloride
Cream of Tartar.....	Potassium Bitartrate
Epsom Salts.....	Magnesium Sulphate
Fowler's Solution.....	Potassium Arsenite
Glauber's Salts.....	Sodium Sulphate
Gypsum.....	Calcium Sulphate
Horn Silver.....	Silver Chloride
Hartshorn.....	Ammonia Water
Hypo.....	Sodium Hyposulphite
Laughing Gas.....	Nitrous Oxide
Lime.....	Calcium Oxide
Lime Water.....	Calcium Hydrate
Litharge.....	Lead Oxide
Lunar Caustic.....	Silver Nitrate
Liver of Sulphur.....	Potassium Sulphide
Magnesia.....	Magnesium Oxide
Meerschäum.....	Magnesium Silicate
Mosaic Gold.....	Tin Bisulphide
Nitre.....	Sodium Nitrate
Nitre-Cake.....	Sodium Bisulphate
Oil of Vitriol.....	Sulphuric Acid
Prussian Blue.....	Ferric Ferro-Cyanide
Prussic Acid.....	Hydrocyanic Acid
Pyro.....	Pyrogallie Acid
Quicksilver.....	Mercury
Red Lead.....	Lead Oxide
Red Precipitate.....	Red Mercuric Oxide
Rochelle Salts.....	Potassium and Sodium Tartrate
Salt (common).....	Sodium Chloride
Saltpetre.....	Potassium Nitrate
Salt Cake.....	Sodium Sulphate
Sal-Ammoniac.....	Ammonium Chloride
Sal-Soda.....	Sodium Carbonate, Cryst.
Sal-Volatile.....	Ammonium Bicarbonate
Soda Ash.....	Sodium Carbonate
Spirits of Salt.....	Muriatic Acid
Sugar of Lead.....	Lead Acetate
Tartar-Emetic.....	Antimony and Potassium Tartrate
Verdigris.....	Copper Sub-Acetate
Vinegar.....	Acetic Acid
Water Glass.....	Sodium Silicate
White Lead.....	Lead Carbonate
White Precipitate.....	Mercuric-Ammonium Chloride
White Vitriol.....	Zinc Sulphate
White Zinc.....	Zinc Oxide

A LIST OF THE COMMONER MINERALS, THEIR DESCRIPTION AND SPECIFIC GRAVITIES

Aluminum	Al		2.60
Andalusite	Al_2SiO_5	Silicate of aluminum	3.16-3.20
Anglesite	PbSO_4	Lead sulphate	6.12-6.39
Anthracite		Hard Coal	1.32-1.70
Antimony	Sb		6.71
Apatite	$3\text{Ca}_3\text{P}_2\text{O}_8, \text{CaF}_2$	Phosphate of lime	3.17-3.23
Aragonite	CaCO_3	Carbonate of lime	2.94
Argentite	Ag_2S	Silver sulphide	7.20-7.36
Arsenic	As		5.73
Arsenolite	As_2O_3	White arsenic	3.70-3.72
Asphaltum			1.0-1.80
Atacamite	$\text{CuCl}_2 \cdot 3\text{Cu}(\text{OH})_2$	Chloride of copper	3.75
Azurite	$\text{Cu}_2(\text{OH})_2(\text{CO}_3)_2$	Blue carbonate of copper	3.77-3.83
Barite	BaSO_4	Barium sulphate	4.3-4.6
Bauxite	$\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$	Hydrate oxide of aluminum	2.55
Beryl	$\text{Be}_2\text{Al}_2\text{Si}_2\text{O}_{10}$	Silicate of beryllium	2.63-2.80
Biotite		Magnesia-iron mica	2.70-3.10
Bismuth	Bi		9.80
Bismuthinite	Bi_2S_3	Sulphide of bismuth	6.4-6.50
Bituminous Coal		Soft Coal	1.14-1.40
Bornite	Cu_5FeS_4	Sulphide of copper and iron	4.90-5.40
Cadmium	Cd		8.60
Calamine	$\text{H}_2\text{Zn}_2\text{SiO}_5$	Silicate of zinc	3.40-3.50
Calcite	CaCO_3	Carbonate of lime	2.7
Cassiterite	SnO_2	Dioxide of tin	6.8-7.10
Cerargyrite	AgCl	Horn silver	5.55
Cerussite	PbCO_3	Carbonate of lead	6.46-6.57
Chalcocite	Cu_2S	Copper glance	5.5-5.8
Chalcopyrite	CuFeS_2	Copper pyrite	4.1-4.3
Chromite	FeCr_2O_4	Chromic iron	4.32-4.57
Chromium	Cr		6.50
Chrysolite	$(\text{MgFe})_2\text{SiO}_4$	Silicate of magnesia and iron	3.27-3.37
Cinnabar	HgS	Sulphide of mercury	8.0-8.2
Cobalt			8.6
Cobaltite	CoAsS	Sulph-arsenide of cobalt	6.0-6.30
Copper	Cu		8.8-8.90
Corundum	Al_2O_3	Oxide of aluminum	3.95-4.10
Cryolite	Na_3AlF_6	Fluoride of aluminum and sodium	3.00
Cuprite	Cu_2O	Red copper ore	5.85-6.15
Cyanite	Al_2SiO_5	Aluminum silicate	3.56-3.67
Diamond	C		3.50
Dolomite	$(\text{CaMg})\text{CO}_3$	Carbonate of lime & magnesia	2.80-2.90
Enargite	Cu_3AsS_4		4.45
Epidote	$\text{HCa}_2(\text{AlFe})_3$		
	Si_2O_3	Silicate of iron alumina & lime	3.25-3.5
Fluorite	CaF_2	Fluor spar	3.2

			Spec. Grav.
Franklinite.....		Oxide of zinc, manganese and iron.....	5.07-5.22
Galena.....	PbS.....	Sulphide of lead.....	7.43
Garnet.....			3.15-4.3
Gold.....	Au.....		15.6-19.3
Graphite.....	C.....		2.09-2.23
Gypsum.....	CaSO ₄ +2H ₂ O.....	Sulphate of lime.....	2.3
Hematite.....	Fe ₂ O ₃	Red oxide of iron.....	4.9 -5.3
Ice.....	H ₂ O.....		0.916
Iodyrite.....	AgI.....	Iodide of silver.....	5.6-5.7
Iridium.....	Ir.....		22.42
Iron.....	Fe.....		7.86
Kaolinite.....	2H ₂ OAl ₂ O ₃ 2SiO ₂	Silicate of alumina.....	2.6
Lead.....	Pb.....		11.37
Limonite.....	2Fe ₂ O ₃ 3H ₂ O.....	Brown oxide of iron.....	3.6 -4.0
Magnesite.....	MgCO ₃	Carbonate of magnesia.....	3.0 -3.12
Magnetite.....	FeO, Fe ₂ O ₃	Magnetic oxide of iron.....	5.16-5.18
Malachite.....	Cu ₂ (OH) ₂ CO ₃	Green carbonate of copper.....	3.9 -4.0
Manganese.....	Mn.....		7.39
Manganite.....	Mn ₂ O ₃ H ₂ O.....	Hydrate manganese oxide.....	4.2 -4.4
Monazite.....			4.8 -5.1
Marcasite.....	FeS ₂	White iron pyrite.....	4.85-4.90
Mercury.....	Hg.....		13.6
Millerite.....	NiS.....	Nickel sulphide.....	5.3 -5.6
Mimetite.....	3Pb ₃ As ₂ O ₃ PbCl ₂	Lead arsenate.....	7.0-7.25
Muscovite.....	H ₂ KAl ₃ (SiO ₄) ₃	Potash mica.....	2.76-3.0
Naphtha.....			0.60-0.756
Nicolite.....	NiAs.....	Nickel arsenide.....	7.33-7.67
Nickel.....	Ni.....		8.9
Opal.....	SiO ₂ nH ₂ O.....		1.9 -2.3
Orpiment.....	As ₂ S ₃	Yellow sulphide of arsenic.....	3.4 -3.5
Orthoclase.....	KAlSi ₃ O ₈	Potash feldspar.....	2.46-2.6
Ozocerite.....		Mineral wax.....	0.85-0.90
Palladium.....	Pd.....		11.3-11.8
Platinum.....	Pt.....		14.0-19.0
Proustite.....	Ag ₃ AsS ₃	Light red silver ore.....	5.57-5.64
Pyrargyrite.....	Ag ₃ SbS ₃	Dark red silver ore.....	5.77-5.86
Pyrite.....	FeS ₂	Iron sulphide.....	4.95-5.10
Pyrolusite.....	MnO ₂	Dioxide of manganese.....	4.82
Pyromorphite.....	3Pb ₃ P ₂ O ₃ PbCl ₂	Lead phosphate.....	6.5 -7.1
Pyrrhotite.....	Fe ₉ S ₁₂	Magnetic pyrite.....	4.58-4.64
Quartz.....	SiO ₂		2.65-2.66
Realgar.....	AsS.....	Red sulphide of arsenic.....	3.55
Rhodochrosite.....	MnCO ₃	Carbonate of manganese.....	3.45-3.6
Rhodonite.....	MnSiO ₃	Silicate of manganese.....	3.40-3.68
Rutile.....	TiO ₂	Dioxide of titanium.....	4.2
Serpentine.....	H ₂ Mg ₃ Si ₂ O ₉	Silicate of magnesia.....	2.50-2.65
Siderite.....	FeCO ₃	Carbonate of iron.....	3.8 -3.9
Silver.....	Ag.....		10.1-11.1

			Spec. Grav.
Smaltite.....	CoAs_2	Arsenide of cobalt.....	6.4-6.6
Smithsonite.....	ZnCo_3	Carbonate of zinc.....	4.30-4.45
Sphalerite.....	ZnS	Sulphide of zinc.....	3.9-4.
Spinel.....	MgAl_2O_4	Aluminate of magnesia.....	3.5-4.1
Stephanite.....	Ag_3SbS_4	Brittle silver.....	6.2-6.3
Stibnite.....	Sb_2S_3	Sulphide of antimony.....	4.5-4.6
Sulphur.....	S		2.08
Sylvanite.....	$(\text{Au}, \text{Ag})\text{Te}$	Telluride of gold and silver.....	7.9-8.3
Talc.....	$\text{H}_2\text{Mg}_3\text{Si}_4\text{O}_{12}$	Silicate of magnesia.....	2.7-2.8
Tephroite.....	Mn_2SiO_4	Silicate of manganese.....	4.0-4.1
Tetrahedrite.....	$4\text{Cu}_2\text{S}, \text{Sb}_2\text{S}_3$	Gray copper.....	4.4-5.1
Tin.....	Sn		7.29
Topaz.....		Fluo-silicate of alumina.....	3.4-3.6
Tourmaline.....		Silicate of alumina, iron and mag- nesia.....	2.98-3.20
Willemite.....	Zn_2SiO_4	Silicate of zinc.....	3.9-4.18
Wolframite.....	$(\text{Fe}, \text{Mn})\text{WO}_4$	Tungstate of iron and manganese.....	7.2-7.5
Wulfenite.....	PbMoO_4	Molybdate of lead.....	6.7-7.0
Zinc.....	Zn		7.15
Zincite.....	ZnO	Zinc oxide.....	5.43-5.7
Zircon.....	ZrSiO_4	Silicate of zirconium.....	4.70

USEFUL INFORMATION

RULES FOR CALCULATING THE SPEED OF PULLEYS

The diameter of the driven being given, to find its number of revolutions: **Rule** — Multiply the diameter of the driver by the number of revolutions and divide by the diameter of the driven; the quotient will be the number of revolutions of the driven.

The diameter and revolutions of the driver being given, to find the diameter of the driven that shall make any given number of revolutions in the same time: **Rule** — Multiply the diameter of the driver by its number of revolutions and divide the product by the number of revolutions at which the driver is to run; the quotient will be the diameter.

To ascertain the size of the driver: **Rule** — Multiply the diameter of the driven by the number of revolutions you wish to make and divide the product by the revolutions of the driver; the quotient will be the diameter of the driver.

In ordering pulleys, give first the diameter, then the face, exact bore, whether key seated or set screwed, and whether flat face for shifting belt or crowning for non-shifting belt.

HOW TO ASCERTAIN HORSE POWER OF BOILERS

Standard adopted by American Society of Mechanical Engineers is 30 pounds of water evaporated into dry steam per hour from temperature of feed water 100° Fahrenheit, into steam of 70 pounds pressure.

Compound engines will develop a horsepower on 15 pounds of water.

Single condensing engine will develop a horsepower on 18 to 22 pounds of water.

Automatic non-condensing engines will develop a horsepower on 28 to 32 pounds of water.

Slide-valve throttle-governing engines will develop a horsepower on 40 to 60 pounds of water.

STEAM MEMORANDA

A cubic inch of water evaporated under ordinary atmospheric pressure is converted into one cubic foot of steam (approximately).

The specific gravity of steam (at atmospheric pressure) is .411 that of air at 34° Fahrenheit, and .0006 that of water at same temperature.

27.222 cubic feet of steam weigh one pound; 13.817 cubic feet of air weigh one pound.

Locomotives average a consumption of 3,000 gallons of water per 100 miles run.

The best designed boilers, well set, with good draft, and skillful firing, will evaporate from 7 to 10 pounds of water per pound of first-class coal.

On one square foot of grate can be burned on an average from 10 to 12 pounds of hard coal, or 18 to 20 pounds of soft coal, per hour, with natural draft. With forced draft nearly double these amounts can be burned.

Steam engines, in economy, vary from 14 to 60 pounds of feed water, and from 1½ to 7 pounds of coal per hour per indicated horsepower.

Condensing engines require from 20 to 30 gallons of water, at an average low temperature, to condense the steam represented by every gallon of water evaporated in the boilers supplying the engines — approximately for most engines, we say, from 1 to 1½ gallons condensing water per minute, per indicated horsepower.

WATER

NOTE.—These figures are all for water at its maximum density, that is, at a temperature of 39.2° Fahrenheit.

1 cubic foot of water = 62.425 pounds, = 28.3153 kilos, = 7.48 gallons.

1 cubic inch of water = 0.036125 pounds, = 252.88 grains, = 16.386 grams.

1 ton of water = 32.038 cubic feet, = 239.665 gallons.

1 pound of water = 0.016019 cubic foot, = 0.47933 quart, = 27.681 cubic inches, = 0.45359 liter.

1 gallon of water = 8.3448 pounds.

1 cubic meter of water = 2204.6 pounds.

1 kilo of water, or 1 liter = 2.2046 pounds, = 0.035317 cubic foot, = 61.027 cubic inches, = 1.0567 quarts.

1 cubic centimeter of water = 1 gram, = 15.432 grains.

USEFUL INFORMATION

Rust-Joint Cement.—(Quickly setting.)—1 sal-ammoniac in powder (by weight), 2 flour of sulphur, 80 iron borings made to a paste with water.

Rust-Joint.—(Slowly setting.)—2 sal-ammoniac, 1 flour of sulphur, 200 iron borings. The latter cement is the best if the joint is not required for immediate use.

Case-Hardening.—Place horn, hoof, bone-dust, or shreds of leather, together with the article to be case-hardened, in an iron box subject to a blood-red heat, then immerse the article in cold water.

Case-Hardening with Prussiate of Potash.—Heat the article after polishing, to a bright red, rub the surface over with prussiate of potash; allow it to cool to dull red and immerse it in water.

Case-Hardening Mixtures.—3 prussiate of potash, 1 sal-ammoniac. Or, 1 prussiate of potash, 2 sal-ammoniac, 2 bone-dust.

Glue to Resist Moisture.—1 pound of glue melted in 2 quarts of skim milk.

Marine Glue.—1 of India rubber, 12 of mineral naphtha or coal tar. Heat gently, mix, and add 20 of powdered shellac. Pour out on a slab to cool. When used, to be heated to about 250 degrees.

Glue Cement to Resist Moisture.—1 glue, 1 black rosin, $\frac{1}{4}$ red ochre. Mix with least possible quantity of water. Or, 4 of glue, or 1 oxide of iron, 1 of boiled oil (by weight).

To Remove Rust from Steel.—Steel which has been rusted can be cleaned by brushing with a paste compound of $\frac{1}{2}$ ounce cyanide potassium, $\frac{1}{2}$ ounce castile soap, 1 ounce whiting, and water sufficient to form a paste. The steel should be washed with a solution of $\frac{1}{2}$ ounce cyanide potassium in 2 ounces water.

To Preserve Steel from Rust.—1 caoutchouc, 16 turpentine. Dissolve with a gentle heat, then add 8 parts boiled oil. Mix by bringing them to the heat of boiled water; apply to the steel with a brush, in the way of varnish. It may be removed with turpentine.

To Clean Brass.—1 roche alum and 16 water. The articles to be cleaned must be made warm, then rubbed with the above mixture, and finished with fine tripoli.

Cement to Resist Fire and Water and Harden Quickly.—Two parts finely sifted unoxidized iron filings; one part perfectly dry, finely powdered loam. Knead the mixture with strong vinegar, into a homogeneous plastic mass, to be used as soon as made.

For Turned and Bored Joints.—One part white lead, one part red lead. Mix with boiled linseed oil to the proper consistency.

For Stopping Joints, etc.—White lead in oil, mixed with enough white sand to make a stiff paste. This grows hard by exposure, and resists heat, cold and water.

Glycerine Cement.—A valuable cement for general use, stopping leaks in tanks, joining chemical apparatus, such as glass and brass; in fact, closing cracks and stopping leaks in almost everything, may be made by mixing commercial glycerine and litharge to the consistency of dough. It may be somewhat improved by using Portland cement and litharge, equal parts, when the joints or cracks are large.

Eighty parts of sifted cast iron turning, two parts of powdered sal-ammoniac, and one part sulphur, made into a thick paste with water and mixed fresh for use, makes a good cement for stopping holes in castings.

Asbestos is one flexible substance that electricity will not burn.

Wood ashes can be used to assist in keeping amalgamated table plates in good working condition where the mill is not run nights. After shutting off the power at night and brushing up the plates, wood ashes freely sprinkled over them, and wet to form a paste, can be left on them till morning. The potash of the wood ashes cleans the plates of all grease and tends to soften and liven up the amalgam.

USEFUL INFORMATION

ELECTRICAL UNITS

Volt—The unit of electrical motive force. Force required to send one ampere of current through one ohm of resistance.

Ohm—Unit of resistance. The resistance offered to the passage of one ampere, when impelled by one volt.

Ampere—Unit of current. The current which one volt can send through a resistance of one ohm.

Coulomb—Unit of quantity. Quantity of current which, impelled by one volt, would pass through one ohm in one second.

Farad—Unit of capacity. A conductor or condenser which will hold one coulomb under the pressure of one volt.

Joule—Unit of work. The work done by one watt in one second.

Watt—The unit of electrical energy, and is the product of ampere and volt. That is, one ampere of current flowing under a pressure of one volt gives one watt of energy.

One electrical horsepower is equal to 746 watts.

One kilowatt is equal to 1,000 watts.

To find the watts consumed in a given electrical circuit, such as a lamp, multiply the volts by the amperes.

To find the volts, divide the watts by the amperes.

To find the amperes, divide the watts by the volts.

To find the electrical horsepower required by a lamp, divide the watts of the lamp by 746.

To find the number of lamps that can be supplied by one electrical horsepower of energy, divide 746 by the watts of the lamp.

To find the electrical horsepower necessary, multiply the watts per lamp by the number of lamps, and divide by 746.

To find the mechanical horsepower necessary to generate the required electrical horsepower, divide the latter by the efficiency of the generator.

To find the amperes of a given circuit, of which the volts and ohms resistance are known, divide the volts by the ohms.

To find the volts, when the amperes and watts are known, multiply the amperes by the ohms.

To find the resistance in ohms, when the volts and amperes are known, divide the volts by the amperes.

MISCELLANEOUS MULTIPLIERS

Cu. ft. per sec. $\times 449$ = U. S. Gals. per min.

U. S. Gals. per min. $\times 3.85$ = Cu. inches per sec.

U. S. Gals. per min. $\times 6$ = Tons per day.

Avoirdupois oz. per min. $\times 0.0450$ = Tons per day.

Troy oz. per min. $\times 0.04937$ = Tons per day.

Grams per min. $\times 0.00159$ = Tons per day.

Tons per day $\times 630$ = Grams per min.

Tons per day $\times 1.39$ = Pounds Av. per min.

Troy oz. per ton $\times 0.00343$ = % per ton.

% per ton $\times 292$ = Troy oz. per ton.

Avoirdupois ounces $\times 0.9114$ = Troy oz.

Troy ounces $\times 1.0971$ = Avoirdupois oz.

Grams $\times 0.0321$ = Troy oz.

Grams $\times 0.0353$ = Avoirdupois oz.

Millimeters $\times 0.04$ = inches.

Inches $\times 25$ = millimeters.

1 Gram per Metric ton = 62c in gold.

1 Gram per Metric ton = 1.55 cents in silver (at 50c).

1 Dwt. of gold = \$1.00.

1 pound Avoirdupois = 453.6 grams.

1 U. S. Gallon = 3785.3 grams.

To convert square hole screens into their equivalents in millimeters:

Square holes in inches $\times 35.5$ = rnd. holes in mm.

Round holes in mm. $\times 0.0283$ = sq. holes in inches.

Square holes $\times 1.41$ = rnd. holes.

USEFUL INFORMATION

CIRCUMFERENCE AND AREA OF CIRCLES

Diam- eter	Circum- ference	Area	Diam- eter	Circum- ference	Area	Diam- eter	Circum- ference	Area	Diam- eter	Circum- ference	Area
$\frac{1}{8}$	.3927	.0123	10	31.41	78.54	30	94.24	706.86	65	204.2	3318.3
$\frac{1}{4}$	.7854	.0491	$10\frac{1}{2}$	32.98	86.59	31	97.38	754.76	66	207.3	3421.2
$\frac{3}{8}$	1.178	.1104	11	34.55	95.03	32	100.5	804.24	67	210.4	3525.6
$\frac{1}{2}$	1.570	.1963	$11\frac{1}{2}$	36.12	103.86	33	103.6	855.30	68	213.6	3631.6
$\frac{5}{8}$	1.963	.3068	12	37.69	113.09	34	106.8	907.92	69	216.7	3739.2
$\frac{3}{4}$	2.356	.4418	$12\frac{1}{2}$	39.27	122.71	35	109.9	962.11	70	219.9	3848.4
$\frac{7}{8}$	2.748	.6013	13	40.84	132.73	36	113.0	1017.8	71	223.0	3959.2
1	3.141	.7854	$13\frac{1}{2}$	42.41	143.13	37	116.2	1075.2	72	226.1	4071.5
$1\frac{1}{8}$	3.534	.9940	14	43.98	153.93	38	119.3	1134.1	73	229.3	4185.4
$1\frac{1}{4}$	3.927	1.227	$14\frac{1}{2}$	45.55	165.13	39	122.5	1194.5	74	232.4	4300.8
$1\frac{3}{8}$	4.319	1.484	15	47.12	176.71	40	125.6	1256.6	75	235.6	4417.8
$1\frac{1}{2}$	4.712	1.767	$15\frac{1}{2}$	48.69	188.69	41	128.8	1320.2	76	238.7	4536.4
$1\frac{5}{8}$	5.105	2.073	16	50.26	201.06	42	131.9	1385.4	77	241.9	4656.6
$1\frac{3}{4}$	5.497	2.405	$16\frac{1}{2}$	51.83	213.82	43	135.0	1452.2	78	245.0	4778.3
$1\frac{7}{8}$	5.890	2.761	17	53.40	226.98	44	138.2	1520.5	79	248.1	4901.6
2	6.283	3.141	$17\frac{1}{2}$	54.97	240.52	45	141.3	1590.4	80	251.3	5026.5
$2\frac{1}{4}$	7.068	3.976	18	56.54	254.46	46	144.5	1661.9	81	254.4	5153.0
$2\frac{1}{2}$	7.854	4.908	$18\frac{1}{2}$	58.11	268.80	47	147.6	1734.9	82	257.6	5281.0
$2\frac{3}{4}$	8.639	5.939	19	59.69	283.52	48	150.7	1809.5	83	260.7	5410.6
3	9.424	7.068	$19\frac{1}{2}$	61.26	298.64	49	153.9	1885.7	84	263.8	5541.7
$3\frac{1}{4}$	10.21	8.295	20	62.83	314.16	50	157.0	1963.5	85	267.0	5674.5
$3\frac{1}{2}$	10.99	9.621	$20\frac{1}{2}$	64.40	330.06	51	160.2	2042.8	86	270.1	5808.8
$3\frac{3}{4}$	11.78	11.044	21	65.97	346.36	52	163.3	2123.7	87	273.3	5944.6
4	12.56	12.566	$21\frac{1}{2}$	67.54	363.05	53	166.5	2206.1	88	276.4	6082.1
$4\frac{1}{2}$	14.13	15.904	22	69.11	380.13	54	169.6	2290.2	89	279.6	6221.1
5	15.70	19.635	$22\frac{1}{2}$	70.68	397.60	55	172.7	2375.8	90	282.7	6361.7
$5\frac{1}{2}$	17.27	23.758	23	72.25	415.47	56	175.9	2463.0	91	285.8	6503.9
6	18.84	28.274	$23\frac{1}{2}$	73.82	433.73	57	179.0	2551.7	92	289.0	6647.6
$6\frac{1}{2}$	20.42	33.183	24	75.39	452.39	58	182.2	2642.0	93	292.1	6792.9
7	21.99	38.484	$24\frac{1}{2}$	76.96	471.43	59	185.3	2733.9	94	295.3	6939.8
$7\frac{1}{2}$	23.56	44.178	25	78.54	490.87	60	188.4	2827.4	95	298.4	7088.2
8	25.13	50.265	26	81.68	530.93	61	191.6	2922.4	96	301.5	7238.2
$8\frac{1}{2}$	26.70	56.745	27	84.82	572.55	62	194.7	3019.0	97	304.7	7389.8
9	28.27	63.617	28	87.96	615.75	63	197.9	3117.2	98	307.8	7542.9
$9\frac{1}{2}$	29.84	70.882	29	91.10	660.52	64	201.0	3216.9	99	311.0	7697.7

To compute the circumference of a diameter greater than any in the above table:

RULE.—Divide the dimension by 2, 3, 4, etc., if practicable, until it is reduced to a diameter to be found in table. Take the tabular circumference of this diameter, multiply it by 2, 3, 4, etc., according as it was divided, and the product will be the circumference required.

Example.—What is the circumference of a diameter of 125? $125 \div 5 = 25$. Tabular circumference of 25 = 78.54; $78.54 \times 5 = 392.7$, circumference required.

COMPARISON OF WIRE AND SHEET METAL GAUGES

No. of Gauge	BROWN AND SHARPE'S		BIR' HAM		Roebing's or Washburn and Moen's	Trenton Iron Company	U. S. Legal Standard	British Imperial and Legal Standard	Zinc Number	Old English	No. of Gauge
	Inches	Nearest Millimeter Dimensions	Wire or Stubs Gauge	Sheet Metal Gauge							
			In.	In.	In.	In.	In.	In.	In.		
7/0					.490		.50000	.500			7/0
6/0					.460		.46875	.464			6/0
5/0					.430	.450	.43750	.432			5/0
4/0	.46000	11.683	.454		.393	.400	.40625	.400		.454	4/0
3/0	.40964	10.405	.425		.362	.360	.37500	.372		.425	3/0
2/0	.36480	9.266	.380		.331	.330	.34375	.348		.380	2/0
0	.32486	8.251	.340		.307	.305	.31250	.324		.340	0
1	.28930	7.348	.300	.0085	.283	.285	.28125	.300	.002	.300	1
2	.25763	6.544	.284	.0095	.263	.265	.265625	.276	.004	.284	2
3	.22942	5.827	.259	.0105	.244	.245	.25000	.252	.006	.259	3
4	.20431	5.189	.238	.012	.225	.225	.234375	.232	.008	.238	4
5	.18194	4.621	.220	.014	.207	.205	.21875	.212	.010	.220	5
6	.16202	4.115	.203	.016	.192	.190	.203125	.192	.012	.203	6
7	.14428	3.665	.180	.019	.177	.175	.18750	.176	.014	.180	7
8	.12849	3.264	.165	.021	.162	.160	.171875	.160	.016	.165	8
9	.11442	2.906	.148	.023	.148	.145	.15625	.144	.018	.148	9
10	.10190	2.588	.134	.027	.135	.130	.140625	.128	.020	.134	10
11	.09074	2.305	.120	.031	.120	.1175	.12500	.116	.024	.120	11
12	.08081	2.053	.109	.035	.105	.105	.109375	.104	.028	.109	12
13	.07196	1.828	.095	.038	.092	.0925	.09375	.092	.032	.095	13
14	.06408	1.628	.083	.042	.080	.080	.078125	.080	.036	.083	14
15	.05707	1.449	.072	.047	.072	.070	.0703125	.072	.040	.072	15
16	.05082	1.290	.065	.051	.063	.061	.06250	.064	.045	.065	16
17	.04526	1.150	.058	.055	.054	.0525	.05625	.056	.050	.058	17
18	.04030	1.024	.049	.060	.047	.045	.05000	.048	.055	.049	18
19	.03589	.9116	.042	.063	.041	.040	.04375	.040	.060	.040	19
20	.03196	.8118	.035	.065	.035	.035	.03750	.036	.070	.035	20
21	.02846	.7229	.032	.068	.032	.031	.034375	.032	.080	.0315	21
22	.02535	.6439	.028	.072	.028	.028	.03125	.028	.090	.0295	22
23	.02257	.5733	.025	.077	.025	.025	.028125	.024	.100	.027	23
24	.02010	.5105	.022	.082	.023	.0225	.02500	.022	.125	.025	24
25	.01790	.4547	.020	.090	.020	.020	.021875	.020	.250	.023	25
26	.01594	.4049	.018	.100	.018	.018	.01875	.018	.375	.0205	26
27	.01419	.3604	.016	.112	.017	.017	.0171875	.0164	.500	.01875	27
28	.01264	.32106	.014	.124	.016	.016	.015625	.0148	1.000	.0165	28
29	.01126	.2860	.013	.136	.015	.015	.0140625	.0136		.0155	29
30	.01002	.2545	.012	.150	.014	.014	.01250	.0124		.01375	30
31	.00893	.2268	.010	.166	.0135	.013	.0109375	.0116		.01225	31
32	.00795	.2019	.009	.182	.013	.012	.01015625	.0108		.01125	32
33	.00708	.1798	.008	.200	.011	.011	.009375	.0100		.01025	33
34	.00630	.1600	.007	.216	.010	.010	.00859375	.0092		.0095	34
35	.00561	.1425	.005	.238	.0095	.0095	.0078125	.0084		.0090	35
36	.00500	.1270	.004	.250	.009	.009	.00703125	.0076		.0075	36
37	.00445	.1130		.270	.0085	.0085	.006640625	.0068		.0065	37
38	.00396	.1006		.278	.008	.008	.00625	.0060		.00575	38
39	.00353	.0897		.289	.0075	.0075		.0052		.005	39
40	.00314	.0798		.300	.007	.007		.0048		.0045	40
41	.00280	.0711						.0044			41
42	.00249	.0632						.0040			42

**THE VALUE OF GOLD PER TROY OUNCE AT DIFFERENT DEGREES OF FINE-
NESS, BASED ON \$20.6718 PER OUNCE FOR 1000 FINE**

U. S. Currency

Fine	\$	Cents	Fine	\$	Cents	Fine	\$	Cents	Fine	\$	Cents
10		20.67	260	5	37.47	510	10	54.26	760	15	71.06
20		41.34	270	5	58.14	520	10	74.94	770	15	91.73
30		62.02	280	5	78.81	530	10	95.61	780	16	12.40
40		82.69	290	5	99.48	540	11	16.28	790	16	33.07
50	1	03.36	300	6	20.16	550	11	36.95	800	16	53.75
60	1	24.03	310	6	40.83	560	11	57.62	810	16	74.42
70	1	44.70	320	6	61.50	570	11	78.29	820	16	95.09
80	1	65.37	330	6	82.17	580	11	98.97	830	17	15.76
90	1	86.05	340	7	02.84	590	12	19.64	840	17	36.43
100	2	06.72	350	7	23.51	600	12	40.31	850	17	57.11
110	2	27.39	360	7	44.19	610	12	60.98	860	17	77.78
120	2	48.06	370	7	64.86	620	12	81.65	870	17	98.45
130	2	68.73	380	7	85.53	630	13	02.33	880	18	19.12
140	2	89.41	390	8	06.20	640	13	23.00	890	18	39.79
150	3	10.08	400	8	26.87	650	13	43.67	900	18	60.46
160	3	30.75	410	8	47.55	660	13	64.34	910	18	81.14
170	3	51.42	420	8	68.22	670	13	85.01	920	19	01.81
180	3	72.09	430	8	88.89	680	14	05.68	930	19	22.48
190	3	92.76	440	9	09.56	690	14	26.36	940	19	43.15
200	4	13.44	450	9	30.23	700	14	47.03	950	19	63.82
210	4	34.11	460	9	50.90	710	14	67.70	960	19	84.50
220	4	54.78	470	9	71.58	720	14	88.37	970	20	05.17
230	4	75.45	480	9	92.25	730	15	09.04	980	20	25.84
240	4	96.12	490	10	12.92	740	15	29.72	990	20	46.51
250	5	16.80	500	10	33.59	750	15	50.39	1000	20	67.18

WHY ONE OUNCE OF FINE GOLD IS WORTH \$20.67

One dollar in gold coin weighs.....25.8 grains Troy

Ten per cent. is alloy (copper)..... 2.58 grains Troy

Therefore the weight of pure gold in a gold dollar is.....23.22 grains Troy

There are 480 grains in a Troy ounce. Therefore $480 \div 23.22 = 20.67$, or the value per Troy ounce is \$20.67.

As an example: \$800.00 in gold coin weighs 43 ozs. Troy; 90 per cent. is fine gold, or 38.7 ounces; \$800.00 divided by 38.7 gives a value of \$20.67 per ounce.

REFERENCE TABLES

TABLE FOR ESTIMATING THE VALUE OF SILVER PER TROY OUNCE AT DIFFERENT DEGREES OF FINENESS, BASED \$0.50 PER OUNCE 1000 FINE.

U. S. Currency.

To find the present market value of silver at any given time, add 2% for every 1c above 50c. Example: To estimate the value of 1 ounce of silver 750 fine, presuming the market value of silver is 63c. per ounce for silver 1000 fine, which is 13 cents, or 26% above the computed value in table below, thus: One ounce of silver 750 fine is worth $37\frac{1}{2}c + 26\% = 47\frac{1}{4}c$.

Fine	Cents	Fine	Cents
10	00.50	510	25.50
20	01	520	26
30	01.50	530	26.50
40	02	540	27
50	02.50	550	27.50
60	03	560	28
70	03.50	570	28.50
80	04	580	29
90	04.50	590	29.50
100	05	600	30
110	05.50	610	30.50
120	06	620	31
130	06.50	630	31.50
140	07	640	32
150	07.50	650	32.50
160	08	660	33
170	08.50	670	33.50
180	09	680	34
190	09.50	690	34.50
200	10	700	35
210	10.50	710	35.50
220	11	720	36
230	11.50	730	36.50
240	12	740	37
250	12.50	750	37.50
260	13	760	38
270	13.50	770	38.50
280	14	780	39
290	14.50	790	39.50
300	15	800	40
310	15.50	810	40.50
320	16	820	41
330	16.50	830	41.50
340	17	840	42
350	17.50	850	42.50
360	18	860	43
370	18.50	870	43.50
380	19	880	44
390	19.50	890	44.50
400	20	900	45
410	20.50	910	45.50
420	21	920	46
430	21.50	930	46.50
440	22	940	47
450	22.50	950	47.50
460	23	960	48
470	23.50	970	48.50
480	24	980	49
490	24.50	990	49.50
500	25	1000	50

COMPARISON

OF FAHRENHEIT, CENTIGRADE AND REAUMUR THERMOMETERS

C. Water freezes at 0°
Water boils at 100°**F.** Water freezes at 32°
Water boils at 212°**R.** Water freezes at 0°
Water boils at 80°

FAHRENHEIT = 9-5 Centi. + 32 = 9-4 Reau. + 32	CENTIGRADE = 5-4 Reau. = 5-9 (Fahr.-32)	REAUMUR = 4-5 Centi. = 4-9 (Fahr.-32)	Fahr.	Cent.	Reau.	Fahr.	Cent.	Reau.
932	500	400	150	65.6	52.4	46	7.8	6.2
800	426.7	341.3	148	64.4	51.6	44	6.7	5.3
752	400	320	146	63.3	50.7	42	5.6	4.4
700	371.1	296.9	144	62.2	49.8	40	4.4	3.6
662	350	280	142	61.1	48.9	38	3.3	2.7
600	315.5	252.4	140	60	48	36	2.2	1.8
572	300	240	138	58.9	47.1	34	1.1	0.9
500	260	208	136	57.8	46.2	32	0	0
464	240	192	134	56.7	45.3	30	-1.1	-0.9
392	200	160	132	55.6	44.4	28	-2.2	-1.8
350	176.7	141.4	130	54.4	43.6	26	-3.3	-2.7
302	150	120	128	53.3	42.7	24	-4.4	-3.6
300	148.9	119.2	126	52.2	41.8	22	-5.6	-4.4
250	121.1	96.9	124	51.1	40.9	20	-6.7	-5.3
212	100	80	122	50	40	18	-7.8	-6.2
210	98.9	79.1	120	48.9	39.1	16	-8.9	-7.1
208	97.8	78.2	118	47.8	38.2	14	-10	-8
206	96.7	77.3	116	46.7	37.3	12	-11.1	-8.9
204	95.6	76.4	114	45.6	36.4	10	-12.2	-9.8
202	94.4	75.6	112	44.4	35.6	8	-13.3	-10.7
200	93.3	74.7	110	43.3	34.7	6	-14.4	-11.6
198	92.2	73.8	108	42.2	33.8	4	-15.6	-12.4
196	91.1	72.9	106	41.1	32.9	2	-16.7	-13.3
194	90	72	104	40	32	0	-17.8	-14.2
192	88.9	71.1	102	38.9	31.1	-2	-18.9	-15.1
190	87.8	70.2	100	37.8	30.2	-4	-20	-16
188	86.7	69.3	98	36.7	29.3	-6	-21.1	-16.9
186	85.6	68.4	96	35.6	28.4	-8	-22.2	-17.8
184	84.4	67.6	94	34.4	27.6	-10	-23.3	-18.7
182	83.3	66.7	92	33.3	26.7	-12	-24.4	-19.6
180	82.2	65.8	90	32.2	25.8	-14	-25.6	-20.4
178	81.1	64.9	88	31.1	24.9	-16	-26.7	-21.3
176	80	64	86	30	24	-18	-27.8	-22.2
174	78.9	63.1	84	28.9	23.1	-20	-28.9	-23.1
172	77.8	62.2	82	27.8	22.2	-22	-30	-24
170	76.7	61.3	80	26.7	21.3	-24	-31.1	-24.9
168	75.6	60.4	78	25.6	20.4	-26	-32.2	-25.8
166	74.4	59.6	76	24.4	19.6	-28	-33.3	-26.7
164	73.3	58.7	74	23.3	18.7	-30	-34.4	-27.6
162	72.2	57.8	72	22.2	17.8	-32	-35.6	-28.4
160	71.1	56.9	70	21.1	16.9	-34	-36.7	-29.3
158	70	56	68	20	16	-36	-37.8	-30.2
156	68.9	55.1	66	18.9	15.1	-38	-38.9	-31.1
154	67.8	54.2	64	17.8	14.2	-40	-40	-32
152	66.7	53.3	62	16.7	13.3	-42	-41.1	-32.9
			60	15.6	12.4	-44	-42.2	-33.8
			58	14.4	11.6	-46	-43.3	-34.7
			56	13.3	10.7	-48	-44.4	-35.6
			54	12.2	9.8	-50	-45.6	-36.4
			52	11.1	8.9	-52	-46.7	-37.3
			50	10	8	-54	-47.8	-38.2
			48	8.9	7.1	-56	-48.9	-39.1

USEFUL INFORMATION

WATER.

Doubling the diameter of a pipe increases its capacity four times. Friction of liquids in pipes increases as the square of the velocity.

To find the pressure in pounds per square inch of a column of water, multiply the height of the column in feet by .434. Approximately, we say that every foot elevation is equal to $\frac{1}{2}$ pound pressure per square inch; this allows for ordinary friction.

To find the diameter of a pump cylinder to remove a given quantity of water per minute (100 feet of piston being the standard of speed), divide the number of gallons by 4, then extract the square root, and the product will be the diameter in inches of the pump cylinder.

To find quantity of water elevated in one minute, running at 100 feet of piston speed per minute, square the diameter of the water cylinder in inches, and multiply by 4.

Example—Capacity of a 5-inch cylinder is desired. The square of the diameter (5 inches) is 25, which, multiplied by 4, gives 100, the number of gallons per minute (approximately).

To find the horsepower necessary to elevate water to a given height, multiply the weight of the water elevated per minute in pounds by the height in feet, and divide the product by 33,000 (an allowance should be added for water friction, and a further allowance for loss in steam cylinder, say from 20 to 30 per cent).

The area of the steam piston, multiplied by the steam pressure, gives the total amount of pressure that can be exerted. The area of the water piston, multiplied by the pressure of water per square inch, gives the resistance. A margin must be made between the power and the resistance to move the pistons at the required speed, say from 20 to 40 per cent, according to speed and other conditions.

To find the capacity of a cylinder in gallons, multiply the area in inches by the length of stroke in inches, will give the total number of cubic inches; divide this amount by 231 (which is the cubical contents of a U. S. gallon in inches), and product is the capacity in gallons.

One cubic foot of water when converted into steam expands to 1728 cubic feet at atmospheric pressure.

The mean pressure of the atmosphere is usually estimated at 14.7 lbs. per square inch, so that with a perfect vacuum it will sustain a column of mercury 29.9 in., or a column of water 33.9 ft. high.

TO COMPUTE ALTITUDE BY BOILING POINT OF WATER.

$517 (212^\circ - T) + (212^\circ - T)^2 = \text{Height.}$

Illustration—What is the height of an elevation, when boiling point of water is 182° F.

$517 \times (212^\circ - 182^\circ) + (212^\circ - 182^\circ)^2 = 517 \times 30 + 30^2 = 16,410 \text{ feet.}$

Corrections for temperature of atmosphere to be made in connection with formula.

Temperature Deg. Fahr.	Correction	Temperature Deg. Fahr.	Correction	Temperature Deg. Fahr.	Correction	Temperature Deg. Fahr.	Correction
0	.936	28	.992	56	1.050	84	1.108
2	.940	30	.996	58	1.054	86	1.112
4	.944	32	1.000	60	1.058	88	1.116
6	.948	34	1.004	62	1.062	90	1.120
8	.952	36	1.008	64	1.066	92	1.124
10	.956	38	1.012	66	1.071	94	1.128
12	.960	40	1.016	68	1.075	96	1.132
14	.964	42	1.020	70	1.079	98	1.136
16	.968	44	1.024	72	1.083	100	1.140
18	.972	46	1.028	74	1.087	102	1.144
20	.976	48	1.032	76	1.091	104	1.148
22	.980	50	1.036	78	1.096	106	1.152
24	.984	52	1.041	80	1.100	...	.....
26	.988	54	1.046	82	1.104	...	.....

Illustration.— Assume temperature of atmosphere in preceding illustration to have been 80° F.

Then $16410 \times 1.1 = 18,051 \text{ feet.}$

TABLE—TEMPERATURE OF BOILING WATER. CORRESPONDING TO THE HEIGHT OF BAROMETER AND ALTITUDE ABOVE SEA LEVEL

Thermo. Degrees	Baro. Inches	Alt. Feet	Thermo. Degrees	Baro. Inches	Alt. Feet	Thermo. Degrees	Baro. Inches	Alt. Feet
184.0	16.79	15221	194.0	20.82	9579	204.0	25.59	4169
.2	16.86	15112	.2	20.91	9466	.2	25.70	4057
.4	16.93	15003	.4	21.00	9353	.4	25.88	3945
.6	17.00	14895	.6	21.09	9241	.6	25.91	3844
.8	17.08	14772	.8	21.18	9130	.8	26.01	3742
185.0	17.16	14649	195.0	21.26	9031	205.0	26.11	3642
.2	17.23	14543	.2	21.35	8920	.2	26.22	3532
.4	17.31	14421	.4	21.44	8810	.4	26.33	3422
.6	17.38	14315	.6	21.53	8700	.6	26.43	3322
.8	17.46	14195	.8	21.62	8590	.8	26.54	3213
186.0	17.54	14075	196.0	21.71	8481	206.0	26.64	3115
.2	17.62	13956	.2	21.81	8361	.2	26.75	3007
.4	17.70	13837	.4	21.90	8253	.4	26.86	2899
.6	17.78	13718	.6	21.99	8145	.6	26.97	2792
.8	17.86	13601	.8	22.08	8038	.8	27.08	2685
187.0	17.93	13498	197.0	22.17	7932	207.0	27.18	2589
.2	18.00	13396	.2	22.27	7814	.2	27.29	2483
.4	18.08	13280	.4	22.36	7708	.4	27.40	2377
.6	18.16	13164	.6	22.45	7602	.6	27.51	2272
.8	18.24	13049	.8	22.54	7498	.8	27.62	2167
188.0	18.32	12934	198.0	22.64	7381	208.0	27.73	2063
.2	18.40	12820	.2	22.74	7266	.2	27.84	1959
.4	18.48	12706	.4	22.84	7151	.4	27.95	1856
.6	18.56	12593	.6	22.93	7048	.6	28.06	1753
.8	18.64	12480	.8	23.02	6945	.8	28.17	1650
189.0	18.72	12367	199.0	23.11	6843	209.0	28.29	1539
.2	18.80	12256	.2	23.21	6729	.2	28.40	1437
.4	18.88	12144	.4	23.31	6617	.4	28.51	1336
.6	18.96	12033	.6	23.40	6516	.6	28.62	1235
.8	19.04	11923	.8	23.49	6415	.8	28.73	1134
190.0	19.13	11799	200.0	23.59	6304	210.0	28.85	1025
.2	19.21	11690	.2	23.69	6193	.2	28.97	916
.4	19.29	11581	.4	23.79	6082	.4	29.09	808
.6	19.37	11472	.6	23.89	5972	.6	29.20	709
.8	19.45	11364	.8	23.98	5874	.8	29.31	610
191.0	19.54	11243	201.0	24.08	5764	211.0	29.42	512
.2	19.62	11136	.2	24.18	5656	.2	29.54	405
.4	19.70	11029	.4	24.28	5547	.4	29.65	308
.6	19.78	10923	.6	24.38	5440	.6	29.77	202
.8	19.87	10804	.8	24.48	5332	.8	29.88	105
192.0	19.96	10685	202.0	24.58	5225	212.0	30.00	sea level
.2	20.05	10567	.2	24.68	5119	below	sea	level
.4	20.14	10450	.4	24.78	5013	.2	30.12	—104
.6	20.22	10346	.6	24.88	4907	.4	30.24	—206
.8	20.31	10230	.8	24.98	4802	.6	30.35	—304
193.0	20.39	10127	203.0	25.08	4697	.8	30.47	—405
.2	20.48	10011	.2	25.18	4593	213.0	30.59	—512
.4	20.57	9896	.4	25.28	4489	.2	30.71	—613
.6	20.65	9794	.6	25.38	4386	.4	30.82	—714
.8	20.73	9693	.8	25.49	4272	.6	30.93	—813

**TABLE OF BEAUMÉ'S HYDROMETERS WITH CORRE-
SPONDING SPECIFIC GRAVITY, AND ALSO THE
NUMBER OF POUNDS CONTAINED IN
ONE U. S. GALLON AT 60° F.**

FOR LIQUIDS LIGHTER THAN WATER

Bé.	Sp. Gr.	Lbs. in Gallon	Bé.	Sp. Gr.	Lbs. in Gallon	Bé.	Sp. Gr.	Lbs. in Gallon	Bé.	Sp. Gr.	Lbs. in Gallon
10	1.0000	8.33	30	0.8750	7.29	50	0.7777	6.48	70	0.7000	5.83
11	0.9929	8.27	31	0.8695	7.24	51	0.7734	6.44	71	0.6965	5.80
12	0.9859	8.21	32	0.8641	7.20	52	0.7692	6.41	72	0.6930	5.78
13	0.9790	8.16	33	0.8588	7.15	53	0.7650	6.37	73	0.6896	5.75
14	0.9722	8.10	34	0.8536	7.11	54	0.7608	6.34	74	0.6863	5.72
15	0.9655	8.04	35	0.8484	7.07	55	0.7567	6.30	75	0.6829	5.69
16	0.9589	7.99	36	0.8433	7.03	56	0.7526	6.27	76	0.6796	5.66
17	0.9523	7.93	37	0.8383	6.98	57	0.7486	6.24	77	0.6763	5.63
18	0.9459	7.88	38	0.8333	6.94	58	0.7446	6.20	78	0.6730	5.60
19	0.9395	7.83	39	0.8284	6.90	59	0.7407	6.17	79	0.6698	5.58
20	0.9333	7.78	40	0.8235	6.86	60	0.7368	6.14	80	0.6666	5.55
21	0.9271	7.72	41	0.8187	6.82	61	0.7329	6.11	81	0.6635	5.52
22	0.9210	7.67	42	0.8139	6.78	62	0.7290	6.07	82	0.6604	5.50
23	0.9150	7.62	43	0.8092	6.74	63	0.7253	6.04	83	0.6573	5.48
24	0.9090	7.57	44	0.8045	6.70	64	0.7216	6.01	84	0.6542	5.45
25	0.9032	7.53	45	0.8000	6.66	65	0.7179	5.98	85	0.6511	5.42
26	0.8974	7.48	46	0.7954	6.63	66	0.7142	5.95	86	0.6481	5.40
27	0.8917	7.43	47	0.7909	6.59	67	0.7106	5.92	87	0.6451	5.38
28	0.8860	7.38	48	0.7865	6.55	68	0.7070	5.89	88	0.6422	5.36
29	0.8805	7.34	49	0.7821	6.52	69	0.7035	5.86	89	0.6392	5.33
..	.....	....	..	.....	....	..	.....	....	90	0.6363	5.30
..	.....	....	..	.....	....	..	.....	....	95	0.6222	5.18

TABLE OF BEAUMÉ'S HYDROMETERS WITH CORRESPONDING SPECIFIC GRAVITIES

FOR LIQUIDS HEAVIER THAN WATER

Temperature 60° Fahrenheit

Beaumé	Specific Gravity	Beaumé	Specific Gravity	Beaumé	Specific Gravity	Beaumé	Specific Gravity
1	1.0069	19	1.1507	37	1.3425	55	1.611
2	1.0139	20	1.1600	38	1.3551	56	1.6292
3	1.0211	21	1.1693	39	1.3679	57	1.6477
4	1.0283	22	1.1788	40	1.3809	58	1.6666
5	1.0357	23	1.1885	41	1.3942	59	1.6860
6	1.0431	24	1.1983	42	1.4077	60	1.7056
7	1.0507	25	1.2083	43	1.4215	61	1.7261
8	1.0583	26	1.2184	44	1.4356	62	1.7469
9	1.0661	27	1.2288	45	1.4500	63	1.7682
10	1.0740	28	1.2393	46	1.4646	64	1.7901
11	1.0820	29	1.2500	47	1.4795	65	1.8125
12	1.0902	30	1.2608	48	1.4949	66	1.8354
13	1.0984	31	1.2719	49	1.5104	67	1.8539
14	1.1068	32	1.2831	50	1.5263	68	1.8831
15	1.1153	33	1.2946	51	1.5425	69	1.9079
16	1.1240	34	1.3063	52	1.5591	70	1.9333
17	1.1328	35	1.3181	53	1.5760	..	.....
18	1.1417	36	1.3302	54	1.5934	..	.....

NORMAL SOLUTIONS

TABLE FOR MAKING NORMAL SOLUTIONS

		Molecular Weight	Grams per Litre
Ammonia.....	NH ₃	17	17.00
Arsenious Acid.....	As ₂ O ₃	198	49.5
Hydrochloric Acid.....	HCl.....	36.37	36.37
Iodine.....	I.....	126.9	126.90
Nitric Acid.....	HNO ₃	63	63.00
Oxalic Acid.....	H ₂ C ₂ O ₄ .2H ₂ O.....	126.04	63.02
Potassium Hydrate.....	KOH.....	56	56.00
Potassium Permanganate.....	K ₂ Mn ₂ O ₈	316.3	31.63
Silver Nitrate.....	AgNO ₃	169.9	169.90
Sodium Carbonate.....	Na ₂ CO ₃	106.1	53.05
Sodium Chloride.....	NaCl.....	58.5	58.50
Sodium Hydrate.....	NaOH.....	40	40.00
Sodium Thiosulphate.....	Na ₂ S ₂ O ₃ .5H ₂ O.....	248.2	248.2
Sulphuric Acid.....	H ₂ SO ₄	98.03	49.15

Courtesy of Western Chemical Mfg. Co.

REFERENCE TABLE

COMPARISON OF BRIX, BEAUMÉ, AND SP. GRAV. SCALES

Brix.	Bé.	Sp. Gr.	Brix.	Bé.	Sp. Gr.	Brix.	Bé.	Sp. Gr.	Brix.	Bé.	Sp. Gr.
0.0	0.0	1.0000	3.1	1.8	1.01213	6.2	3.5	1.02454	9.3	5.3	1.03723
.1	.1	1.00038	.2	1.8	1.01252	.3	3.6	1.02494	.4	5.3	1.03765
.2	.1	1.00077	.3	1.9	1.01292	.4	3.6	1.02535	.5	5.4	1.03806
.3	.2	1.00116	.4	1.9	1.01332	.5	3.7	1.02575	.6	5.4	1.03848
.4	.2	1.00155	.5	2.0	1.01371	.6	3.7	1.02616	.7	5.5	1.03889
.5	.3	1.00193	.6	2.0	1.01411	.7	3.8	1.02657	.8	5.5 ^s	1.03931
.6	.3	1.00232	.7	2.1	1.01451	.8	3.9	1.02694	.9	5.6	1.03972
.7	.4	1.00271	.8	2.2	1.01491	.9	3.9	1.02738	10.0	5.7	1.04014
.8	.45	1.00310	.9	2.2	1.01531	7.0	4.0	1.02779	.1	5.7	1.04055
.9	.5	1.00349	4.0	2.3	1.01570	.1	4.0	1.02819	.2	5.8	1.04097
1.0	.6	1.00388	.1	2.3	1.01610	.2	4.1	1.02860	.3	5.8	1.04139
.1	.6	1.00427	.2	2.4	1.01650	.3	4.1	1.02901	.4	5.9	1.04180
.2	.7	1.00466	.3	2.4	1.01690	.4	4.2	1.02942	.5	5.9	1.04222
.3	.7	1.00505	.4	2.5	1.01730	.5	4.25	1.02983	.6	6.0	1.04264
.4	.8	1.00544	.5	2.5 ^s	1.01770	.6	4.3	1.03024	.7	6.1	1.04306
.5	.85	1.00583	.6	2.6	1.01810	.7	4.4	1.03064	.8	6.1	1.04348
.6	.9	1.00622	.7	2.7	1.01850	.8	4.4	1.03105	.9	6.2	1.04390
.7	1.0	1.00662	.8	2.7	1.01890	.9	4.5	1.03146	11.0	6.2	1.04431
.8	1.0	1.00701	.9	2.8	1.01930	8.0	4.5	1.03187	.1	6.3	1.04473
.9	1.1	1.00740	5.0	2.8	1.01970	.1	4.6	1.03228	.2	6.3	1.04515
2.0	1.1	1.00779	.1	2.9	1.02010	.2	4.6	1.03270	.3	6.4	1.04557
.1	1.2	1.00818	.2	2.9 ^s	1.02051	.3	4.7	1.03311	.4	6.5	1.04599
.2	1.2	1.00858	.3	3.0	1.02091	.4	4.8	1.03352	.5	6.5	1.04641
.3	1.3	1.00897	.4	3.1	1.02131	.5	4.8	1.03393	.6	6.6	1.04683
.4	1.4	1.00936	.5	3.1	1.02171	.6	4.9	1.03434	.7	6.6	1.04726
.5	1.4	1.00976	.6	3.2	1.02211	.7	4.9	1.03475	.8	6.7	1.04768
.6	1.5	1.01015	.7	3.2	1.02252	.8	5.0	1.03517	.9	6.7	1.04810
.7	1.5	1.01055	.8	3.3	1.02292	.9	5.0	1.03558	12.0	6.8	1.04852
.8	1.6	1.01094	.9	3.3 ^s	1.02333	9.0	5.1	1.03599	.1	6.8	1.04894
.9	1.6	1.01134	6.0	3.4	1.02373	.1	5.2	1.03640	.2	6.9	1.04937
3.0	1.7	1.01173	.1	3.5	1.02413	.2	5.2	1.03682	.3	7.0	1.04979

REFERENCE TABLE—CONTINUED

Brix.	Bé.	Sp. Gr.	Brix.	Bé.	Sp. Gr.	Brix.	Bé.	Sp. Gr.	Brix.	Bé.	Sp. Gr.
12.4	7.0	1.05021	15.8	8.9	1.06479	19.2	10.8	1.07973	22.6	12.7	1.09503
.5	7.1	1.05064	.9	9.0	1.06522	.3	10.9	1.08017	.7	12.8	1.09549
.6	7.1	1.05106	16.0	9.0	1.0656	.4	10.9	1.08062	.8	12.8 ^s	1.09595
.7	7.2	1.05149	.1	9.1	1.06609	.5	11.	1.08106	.9	12.9	1.09640
.8	7.2	1.05191	.2	9.2	1.06653	.6	11.1	1.08151	23.0	13.	1.09686
.9	7.3	1.05233	.3	9.2	1.06696	.7	11.1	1.08196	.1	13.	1.09732
13.0	7.4	1.05276	.4	9.3	1.06740	.8	11.2	1.08240	.2	13.1	1.09777
.1	7.4	1.05318	.5	9.3	1.06783	.9	11.2	1.08285	.3	13.1	1.09823
.2	7.5	1.05361	.6	9.4	1.06827	20.0	11.3	1.08329	.4	13.2	1.09869
.3	7.5	1.05404	.7	9.4	1.06871	.1	11.3	1.08374	.5	13.2	1.09915
.4	7.6	1.05446	.8	9.5	1.06914	.2	11.4	1.08419	.6	13.3	1.09961
.5	7.6	1.05489	.9	9.5	1.06958	.3	11.5	1.08464	.7	13.3	1.10007
.6	7.7	1.05532	17.0	9.6	1.07002	.4	11.5	1.08509	.8	13.4	1.10053
.7	7.7 ^s	1.05574	.1	9.7	1.07046	.5	11.6	1.08553	.9	13.5	1.10099
.8	7.8	1.05617	.2	9.7	1.07090	.6	11.6	1.08599	24.0	13.5	1.10145
.9	7.9	1.05660	.3	9.8	1.07133	.7	11.7	1.08643	.1	13.6	1.10191
14.0	7.9	1.05703	.4	9.8	1.07177	.8	11.7	1.08688	.2	13.6	1.10237
.1	8.0	1.05746	.5	9.9	1.07221	.9	11.8	1.08733	.3	13.7	1.10283
.2	8.0	1.05789	.6	9.9	1.07265	21.0	11.8	1.08778	.4	13.7	1.10329
.3	8.1	1.05831	.7	10.0	1.07309	.1	11.9	1.08824	.5	13.8	1.10375
.4	8.1	1.05874	.8	10.0	1.07353	.2	11.9 ^s	1.08869	.6	13.8	1.10421
.5	8.2	1.05917	.9	10.1	1.07397	.3	12.0	1.08914	.7	13.9	1.10468
.6	8.3	1.05960	18.0	10.1	1.07441	.4	12.0	1.08959	.8	14.0	1.10514
.7	8.3	1.06003	.1	10.2	1.07485	.5	12.1	1.09004	.9	14.0	1.10560
.8	8.4	1.06047	.2	10.3	1.07530	.6	12.1	1.09049	25.0	14.1	1.10607
.9	8.4	1.06090	.3	10.3	1.07574	.7	12.2	1.09095	.1	14.1	1.10653
15.0	8.5	1.06133	.4	10.4	1.07618	.8	12.3	1.09140	.2	14.2	1.10700
.1	8.5	1.06177	.5	10.4	1.07662	.9	12.3	1.09185	.3	14.2	1.10746
.2	8.5 ^s	1.06219	.6	10.5	1.07706	22.0	12.4	1.09231	.4	14.3	1.10793
.3	8.6	1.06262	.7	10.5	1.07751	.1	12.5	1.09276	.5	14.3	1.10839
.4	8.7	1.06306	.8	10.6	1.07795	.2	12.5	1.09321	.6	14.4	1.10886
.5	8.8	1.06349	.9	10.6	1.07839	.3	12.6	1.09367	.7	14.5	1.10932
.6	8.8	1.06392	19.0	10.7	1.07884	.4	12.6	1.09412	.8	14.5	1.10979
.7	8.9	1.06436	.1	10.8	1.07928	.5	12.7	1.09458	.9	14.6	1.11026

REFERENCE TABLE—CONCLUDED

Brix.	Bé.	Sp. Gr.	Brix.	Bé.	Sp. Gr.	Brix.	Bé.	Sp. Gr.	Brix.	Bé.	Sp. Gr.
26.0	14.6	1.11072	43.5	24.2	1.19769	61.0	33.5	1.29581	78.5	42.4	1.40586
26.5	14.9	1.11306	44.0	24.5	1.20033	61.5	33.8	1.29878	79.0	42.6	1.40918
27.0	15.2	1.11541	44.5	24.8	1.20299	62.0	34.0	1.30177	79.5	42.9	1.41252
27.5	15.5	1.11776	45.0	25.0	1.20565	62.5	34.3	1.30476	80.0	43.1	1.41586
28.0	15.7	1.12013	45.5	25.3	1.20832	63.0	34.5	1.30777	80.5	43.3	1.41921
28.5	16.0	1.12250	46.0	25.6	1.21100	63.5	34.8	1.31078	81.0	43.6	1.42258
29.0	16.3	1.12488	46.5	25.8	1.21369	64.0	35.1	1.31381	81.5	43.8	1.42595
29.5	16.6	1.12727	47.0	26.1	1.21639	64.5	35.3	1.31684	82.0	44.1	1.42934
30.0	16.8	1.12967	47.5	26.4	1.21910	65.0	35.6	1.31989	82.5	44.3	1.43273
30.5	17.1	1.13207	48.0	26.6	1.22182	65.5	35.8	1.32294	83.0	44.6	1.43614
31.0	17.4	1.13449	48.5	26.9	1.22455	66.0	36.1	1.32601	83.5	44.8	1.43955
31.5	17.7	1.13691	49.0	27.2	1.22728	66.5	36.3	1.32908	84.0	45.1	1.44298
32.0	17.9	1.13934	49.5	27.4	1.23003	67.0	36.6	1.33217	84.5	45.3	1.44641
32.5	18.2	1.14178	50.0	27.7	1.23278	67.5	36.8	1.33526	85.0	45.5	1.44986
33.0	18.5	1.14423	50.5	28.0	1.23555	68.0	37.1	1.33836	85.5	45.8	1.45331
33.5	18.8	1.14669	51.0	28.2	1.23832	68.5	37.4	1.34148	86.0	46.0	1.45678
34.0	19.0	1.14915	51.5	28.5	1.24111	69.0	37.6	1.34460	86.5	46.3	1.46026
34.5	19.3	1.15163	52.0	28.8	1.24390	69.5	37.9	1.34774	87.0	46.5	1.46374
35.0	19.6	1.15411	52.5	29.0	1.24670	70.0	38.1	1.35088	87.5	46.7	1.46724
35.5	19.9	1.15661	53.0	29.3	1.24951	70.5	38.4	1.35403	88.0	47.0	1.47074
36.0	20.1	1.15911	53.5	29.6	1.25233	71.0	38.6	1.35720	88.5	47.2	1.47426
36.5	20.4	1.16162	54.0	29.8	1.25517	71.5	38.9	1.36037	89.0	47.5	1.47778
37.0	20.7	1.16413	54.5	30.1	1.25801	72.0	39.1	1.36355	89.5	47.7	1.48132
37.5	21.0	1.16666	55.0	30.4	1.26086	72.5	39.4	1.36675	90.0	47.9	1.48486
38.0	21.2	1.16920	55.5	30.6	1.26372	73.0	39.6	1.36995	90.5	48.2	1.48842
38.5	21.5	1.71174	56.0	30.9	1.26658	73.5	39.9	1.37317	91.0	48.4	1.49199
39.0	21.8	1.17430	56.5	31.2	1.26946	74.0	40.1	1.37639	91.5	48.6	1.49556
39.5	22.0	1.17686	57.0	31.4	1.27235	74.5	40.4	1.37962	92.0	48.9	1.49915
40.0	22.3	1.17943	57.5	31.7	1.27525	75.0	40.6	1.38287	92.5	49.1	1.50274
40.5	22.6	1.18201	58.0	31.9	1.27816	75.5	40.9	1.38612	93.0	49.3	1.50635
41.0	22.9	1.18460	58.5	32.2	1.28107	76.0	41.1	1.38939	93.5	49.6	1.50996
41.5	23.1	1.18720	59.0	32.5	1.28400	76.5	41.4	1.39266	94.0	49.8	1.51359
42.0	23.4	1.18981	59.5	32.7	1.28694	77.0	41.6	1.39595	94.5	50.0	1.51722
42.5	23.7	1.19243	60.0	33.0	1.28989	77.5	41.9	1.39924	95.0	50.3	1.52087
43.0	23.9	1.19505	60.5	33.2	1.29284	78.0	42.1	1.40254			

REFERENCE TABLES

COMPARISON

GAY-LUSSAC AND SPECIFIC GRAVITY HYDROMETER SCALES

G. L. Degree	Sp. Gr.	G. L. Degree	Sp. Gr.	G. L. Degree	Sp. Gr.	G. L. Degree	Sp. Gr.
100	0.795	75	0.879	50	0.936	25	0.971
99	0.800	74	0.881	49	0.938	24	0.972
98	0.805	73	0.884	48	0.940	23	0.973
97	0.810	72	0.886	47	0.941	22	0.974
96	0.814	71	0.888	46	0.943	21	0.975
95	0.818	70	0.891	45	0.945	20	0.976
94	0.822	69	0.893	44	0.946	19	0.977
93	0.826	68	0.896	43	0.948	18	0.978
92	0.829	67	0.899	42	0.949	17	0.979
91	0.832	66	0.902	41	0.951	16	0.980
90	0.835	65	0.904	40	0.953	15	0.981
89	0.838	64	0.906	39	0.954	14	0.982
88	0.842	63	0.909	38	0.956	13	0.983
87	0.845	62	0.911	37	0.957	12	0.984
86	0.848	61	0.913	36	0.959	11	0.986
85	0.851	60	0.915	35	0.960	10	0.987
84	0.854	59	0.918	34	0.962	9	0.988
83	0.857	58	0.920	33	0.963	8	0.989
82	0.860	57	0.922	32	0.964	7	0.990
81	0.863	56	0.924	31	0.965	6	0.992
80	0.865	55	0.926	30	0.966	5	0.993
79	0.868	54	0.928	29	0.967	4	0.994
78	0.871	53	0.930	28	0.968	3	0.996
77	0.874	52	0.932	27	0.969	2	0.997
76	0.876	51	0.934	26	0.970	1	0.999

TABLE OF SPECIFIC GRAVITY, ETC.

Of

PETROLEUM PRODUCTS

	Degrees of Specific Gravity	Degrees Beaumé	Pounds in 1 Gallon	Pounds in 1 Cubic Foot
Rhigoline.....	.6222	95	5.18	38.89
Benzine or Gasoline.....	.6511	85	5.42	40.69
C. Naphtha.....	.7000	70	5.83	43.75
B. Naphtha.....	.7106	67	5.92	44.41
A. Naphtha.....	.7179	65	5.98	44.87
Kerosene Oil.....	.8000	45	6.66	50.00

OTHER LIGHT LIQUIDS

	Degrees of Specific Gravity	Degrees Beaumé	Pounds in 1 Gallon	Pounds in 1 Cubic Foot
Water.....	1.0000	10	8.33	62.50
Castor Oil.....	.9639	15	8.03	60.24
Linseed Oil, boiled.....	.9411	19	7.84	58.81
Linseed Oil, raw.....	.9299	21	7.75	58.12
Menhaden, light.....	.9325	20	7.77	58.28
Menhaden, dark.....	.9292	21	7.74	58.08
Cotton Seed.....	.9302	21	7.75	58.14
Hemp Seed.....	.9307	20	7.75	58.17
Cod Liver.....	.9270	21	7.72	57.94
Whale.....	.9254	21	7.71	57.84
Sunflower Seed.....	.9250	21	7.70	57.81
Poppy Seed.....	.9243	21	7.70	57.77
Fish.....	.9205	22	7.67	57.53
Olive.....	.9192	22	7.65	57.45
Almond.....	.9180	23	7.65	57.38
Lard.....	.9175	23	7.64	57.34
Rape Seed.....	.9155	23	7.63	57.22
Neatsfoot.....	.9142	23	7.62	57.14
Colza.....	.9136	23	7.61	57.10
Palm.....	.9046	25	7.54	56.54
Sperm, natural.....	.8815	29	7.34	55.09
Sperm, bleached.....	.8813	29	7.34	55.08
Spirits of Turpentine.....	.8600	33	7.16	53.75
Alcohol, 90%.....	.8228	40	6.85	51.43
Alcohol, 95%.....	.8089	43	6.74	50.56
Alcohol, absolute.....	.7938	46	6.61	49.61

NOTE.—In the column marked Beaumé, the nearest whole number is given, omitting fractions.

USEFUL INFORMATION

TABLE OF SPECIFIC GRAVITY AND UNIT WEIGHTS

Water at 39.1° Fahrenheit = 4° Centigrade; 62.425 pounds to the cubic foot (Authority, Kent, Haswell and D. K. Clark.)

	Specific Gravity	Authority	Lbs. per Cu. Ft.	Lbs. per Cu. In.	Kilos per Cu. Decem.
Aluminum, pure cast	2.56		159.63	.0924	2.56
Aluminum, pure rolled	2.68		167.11	.0967	2.68
Aluminum, pure Annealed	2.66		165.86	.0960	2.66
Aluminum, Bronze 10%	7.70	Riche	480.13	.2779	7.70
Aluminum, Bronze 5%	8.26	Riche	515.63	.2984	8.26
Brass, Cu. 67, Zn. 33, cast	8.32	Haswell	519.36	.3006	8.32
Brass, Cu. 60, Zn. 40, cast	8.405	Thurston	524.68	.3036	8.405
Cobalt	8.50	R-A	530.61	.3071	8.50
Brass, plates high yellow	8.549		533.69	.3088	8.549
Bronze composition, Cu. 90-Tin 10 ...	8.669	Thurston	541.17	.3132	8.669
Bronze composition, Cu. 84-Tin 16 ...	8.832	Haswell	551.34	.3191	8.832
Lithium	0.57	R-A	36.83	.0213	.57
Potassium	0.87	R-A	54.31	.0314	.87
Sodium	0.97	R-A	60.55	.0350	.97
Rubidium	1.52	R-A	94.89	.0549	1.52
Calcium	1.57	R-A	98.01	.0567	1.57
Magnesium	1.74	R-A	108.62	.0629	1.74
Caesium	1.88	R-A	117.36	.0679	1.88
Boron	2.00	Haswell	124.85	.0723	2.00
Glucinum	2.07	R-A	129.22	.0748	2.07
Strontium	2.54	R-A	158.56	.0918	2.54
Barium	3.75	R-A	234.09	.1355	3.75
Zirconium	4.15	R-A	259.06	.1499	4.15
Selenium	4.50	Haswell	280.91	.1626	4.50
Titanium	5.30	Haswell	330.85	.1915	5.30
Vanadium	5.50	R-A	343.34	.1987	5.50
Arsenic	5.67	R-A	353.95	.2048	5.67
Columbium	6.00	Haswell	374.55	.2168	6.00
Lanthanum	6.20	Haswell	387.03	.2240	6.20
Niobium	6.27	R-A	391.40	.2265	6.27
Didymium	6.54	R-A	408.26	.2363	6.54
Cerium	6.68	R-A	417.00	.2413	6.68
Antimony	6.71	R-A	418.86	.2424	6.71
Chromium	6.80	R-A	429.49	.2457	6.80
Zinc, cast	6.867	Haswell	428.30	.2479	6.861
Zinc, pure	7.15	R-A	446.43	.2583	7.15
Zinc, rolled	7.191	Haswell	448.90	.2598	7.191

CAPACITY OF BOXES

The following table will often be found convenient, taking inside dimensions:

- A box 8½ inches by 8 inches and 8 inches deep, will contain a peck.
- A box 8 inches square and 4½ inches deep, will contain a gallon.
- A box 7 inches square and 2¾ inches deep, will contain a half gallon.
- A box 4 inches square and 4½ inches deep, will contain a quart.
- A box 3 inches square and 3¾ inches deep, will contain a pint.
- A box 24 inches by 17 inches and 28 inches deep, will contain a barrel.
- A box 18 inches by 15½ inches and 8 inches deep, will contain a bushel.
- A box 13½ inches square and 11¼ inches deep, will contain a bushel.
- A box 12 inches by 11½ inches and 9 inches deep, will contain a half bushel.
- A box 10 inches square and 10¼ inches deep, will contain a half bushel.

USEFUL INFORMATION

SPECIFIC GRAVITY OF CONCENTRATING ORES AND GANGUES

Lead	Specific Gravity	Zinc	Specific Gravity		
Galena (lead sulphide)	7.2 to 7.7	Smithsonite (zinc carbonate)	4.4 to 4.4		
Cerussite (lead carbonate)	6.4 to 6.5	Sphalerite (zinc blende)	3.9 to 4.2		
Anglesite (lead sulphate)	6.1 to 6.4	Willemite (zinc silicate)	3.9 to 4.1		
Copper					
Melaconite (black copper)	6.2 to 6.3	Gangue			
Cuprite (copper oxide)	5.8 to 6.1				
Chalcocite (copper glance)	5.8 to 5.8				
Bornite (peacock copper)	4.4 to 5.5				
Chalcopyrite (copper pyrite)	4.1 to 4.3				
Malachite (copper carbonate)	3.7 to 4.1				
Chrysocalla (silicate of copper)	2.0 to 2.2				
Iron					
Mispickel (iron arsenide)	5.5 to 6.0				
Magnetite (iron oxide)	4.9 to 5.2				
Pyrite (iron bisulphide)	4.8 to 5.2				
Marcasite (iron sulphide)	4.6 to 4.8				
		Barite (heavy spar)	4.3 to 4.7		
		Manganese Garnet	4.1 to 4.5		
		Iron Garnet	3.9 to 4.4		
		Lime Garnet	3.4 to 3.5		
		Fluorite (fluorspar)	3.0 to 3.2		
		Anhydrite (gypsum)	2.8 to 2.9		
		Dolomite (magnesian limestone)	2.8 to 2.9		
		Quartz	2.5 to 2.8		
		Calcite (lime carbonate)	2.5 to 2.7		
		Kaolinite (kaolin)	2.4 to 2.6		

METALLIC CONTENTS OF PURE ORES

Magnetite (magnetic iron ore).....	Iron, 72.0 per cent
Hematite (red oxide of iron).....	Iron, 70.0 per cent
Iron Pyrite.....	Iron, 46.6 per cent
Cuprite (red oxide of copper).....	Copper, 88.8 per cent
Malachite (green carbonate of copper).....	Copper, 62.0 per cent
Azurite (blue carbonate of copper).....	Copper, 61.0 per cent
Bornite (purple or peacock copper).....	Iron, 15 per cent.; Copper, 58.0 per cent
Chalcopyrite (copper pyrite).....	Iron, 30 per cent.; Copper, 34.0 per cent
Chalcocite (copper glance).....	78.0 per cent
Galena (lead sulphide).....	Lead, 86.6 per cent
Cerussite (lead carbonate).....	Lead, 70.0 per cent
Zinc Blende (zinc sulphide).....	Zinc, 67.0 per cent

FREEZING, FUSING, AND BOILING POINTS

Substances	Fahrenheit Degrees	Centigrade Degrees	Reaumur Degrees
Bromine freezes at.....	— 7.3	—18.9	—17.6
Olive oil freezes at.....	50	10	8
Quicksilver freezes at.....	—39	—39.4	—31.5
Water freezes at.....	32	0	0
Bismuth metal fuses at.....	517	269.2	211
Copper fuses at.....	1947	1064	963
Gold fuses at.....	1947	1064	1105
Iron fuses at.....	2800	1538	1230
Lead fuses at.....	621	326.9	260
Potassium fuses at.....	144.5	62.5	50
Silver fuses at.....	1760	960	800
Sodium fuses at.....	204	95.6	76.5
Sulphur fuses at.....	239	115	92
Tin fuses at.....	449	232	182
Zinc fuses at.....	786	419	329.6
Alcohol boils at.....	167	74.4	63
Bromine boils at.....	145	63	50
Ether boils at.....	96	35.5	28.4
Iodine boils at.....	347	175	140
Water boils at.....	212	100	80

REFERENCE TABLES

MELTING POINTS OF VARIOUS SUBSTANCES

The following figures have been taken from various authorities. Those marked (*) are given by Sir Roberts-Austen.

Substance	Deg. Cent.	Deg. Fahr.
Sulphurous Acid.....	-79	-112
Carbonic Acid.....	-70	-94
Mercury.....	-39.4	-39
Bromine.....	-7.3	18.9
Turpentine.....	-10	14
Hyponitric Acid.....	-8.9	16
Ice.....	0.0	32
Nitroglycerine.....	7.2	45
Tallow.....	33.3	92
Phosphorus.....	44.4	112
Acetic Acid.....	16.7	62.5
Stearine.....	42.8—48.9	109 —120
Spermaceti.....	48.9	120
Margaric Acid.....	55.0—60.0	131 —140
Potassium.....	62.5	144.5
Wax.....	61.1—67.8	142 —154
Stearic Acid.....	70.0	158
Sodium.....	95.6	204
Alloy { 3 Lead.....	100	212
2 tin.....		
5 bismuth.....		
Iodine.....	113.0—115.0	236 —238.5
Sulphur.....	115	238.5
Alloy, 1½ tin, 1 lead.....	200	392
Alloy, 1 tin, 1 lead.....	215	419
Tin.....	232	449
Cadmium.....	321.7	561
Bismuth.....	269.2	517
Lead.....	326.9	621
Zinc.....	419	786
Antimony.....	430	806
Aluminum.....	657.3	1215
Magnesium.....	750.	1382
Calcium.....	760	1400
Bronze.....	922	1672
Silver.....	960	1760
Potassium Sulphate.....	1015*	1860*
Gold.....	1064	1947
Copper.....	1064	1947
Cast Iron—white.....	1050 —1135*	1922 —2075*
Cast Iron—gray.....	1220* —1530	2228* —2786
Steel.....	1300 —1378	2372 —2532
Steel—hard.....	1410*	2570*
Steel—mild.....	1475*	2687*
Wrought iron.....	1500 —1600	2732 —2912*
Palladium.....	1900	3452
Platinum.....	1775*	3232

The melting point of metals varies in the tables given by standard authorities due to the amount of impurities contained in the samples experimented upon, and also due to the slight inaccuracy of the instruments or methods used in determining high temperatures, as well as to errors in observation.

ASSAYING

Silver.—The assay for gold and silver is not a very difficult task under ordinary conditions, but there are some ores which require considerable patience and possibly greater familiarity with chemical reactions to successfully obtain correct results.

For silver ores the method that is generally practiced is known as scorification, or the oxidizing of the metal in a clay dish, called a scorifier. The ore is weighed out (say $\frac{1}{10}$ of an assay ton) and placed in a scorifier and test lead (about 25 to 40 grammes, according to the character of the ore) is placed in also. The ore and about one half of the lead are mixed in the bottom of the scorifier, and the rest of the lead poured over the mixture so as to form a cover. A pinch of borax glass is now thrown on the top and the scorifier placed in the muffle. A strong heat is maintained at first to melt the lead; this is effected by closing the muffle door and increasing the draught. As soon as the lead is fused the muffle door is opened. When the fusion is complete clear white fumes of lead arise from the scorifier. The borax glass plays an important part just here by giving liquidaion to the slag so that it can be thrown to the side as fast as formed, exposing the lead for oxidation. When fusion is complete the ring of slag which is continually growing smaller closes over the lead, the heat should be raised for a minute or so and then the scorifier is removed from the muffle with suitable tongs, and the contents poured into a mould. When cold the lead button is hammered into a cube shape, and during the operation the slag is loosened from the button which is now ready for the next step, which is called cupellation, or the separation of the silver from the lead. This operation consists in oxidizing the lead of the lead button. The litharge formed by the heat being partly absorbed by the cupel, and partly driven up the chimney, leaving the gold and silver together as a bead upon the surface of the cupel. Other metals that may have remained in the lead button from the scorifier are also oxidized and so gotten rid of.

A cupel is a small, saucer-shaped vessel, made from pulverized calcined bones, or bone ash. The ash is moistened with water and moulded into the required shape, after drying thoroughly they are ready for the muffle.

When the cupel has been in the muffle a few minutes, and consequently becomes the same temperature of the muffle, the lead button is placed in the cupel by means of suitable tongs and the muffle door closed. If the muffle has been of the proper temperature, in a minute's time or less the lead button will have quietly fused, and on opening the muffle door will appear as a little lake of molten metal on the surface of the cupel, from which arise fumes of oxide of lead. The closing of the muffle door at first is simply in order to melt the lead button by increased heat and absence of air. The muffle door is now taken down and cupellation allowed to proceed. Do not have the muffle too hot, the right degree of heat for correct cupellation can only be acquired by experience.

As the operation continues the button gradually gets smaller and smaller, by oxidation, and volatilization and absorption of the oxide, and this reduction continues until a point is reached when the last of the lead leaves the bead; finally, a film passes over the bead and then no more action is visible. The cupel is now moved to the hottest place in the muffle for a minute or so, and gradually brought out; do not remove the cupel too quickly, as it is possible the bead might "spit," that is, throw off minute particles of silver, occasioning loss.

When cool the bead is grasped by a pair of pincers, thoroughly cleaned and weighed, by using the assay-ton system of weights (which is described in another part of this book), no calculation is necessary to find ounces per ton of gold or silver contained in the ore.

As an illustration, suppose we use $\frac{1}{10}$ assay ton (A. T.) and the resulting bead weighs 17 milligrammes, we would know at once that the ore contained 170 ounces silver per ton, provided the ore did not contain any gold. In case the ore does contain gold, the button is placed in a test tube or parting flask, and a small quantity of dilute C. P. nitric acid poured in, heat gently, and if the proportion of silver to the gold is more than three to one, the silver will dissolve, leaving a brown residue of metallic gold. The dissolved silver is washed several times with pure water from the gold and the residue dried and heated in a porcelain crucible, when the characteristic yellow color of the gold will be plainly seen, this is now weighed, and the weight deducted from the original silver button, the difference will represent the actual silver present in the ore.

ASSAYING—CONTINUED

Gold.—Gold assays are usually conducted by the crucible method; this process is rather more complicated than the scorifier method. One advantage the crucible method has, however, is that more ore can be used for assay, and on low grade gold ores this is a necessity, as in a $\frac{1}{16}$ A. T. scorifier assay, the gold might be so light as to be impossible to weigh with accuracy.

The chemical changes in the crucible method are usually reducing, and that of scorification (as already stated) oxidizing.

The kind and quantity of fluxes vary considerably in the crucible method, so that it would be impossible to suggest a flux that would suit all ores. The character of the ore determines what fluxes should be used, whether acid or basic. This selection of fluxes can only be made by experience, for what might be termed an ordinary ore, a silicious one, with iron, and oxidized, little lime, and little or no sulphur, the following charges might give good results:

Ore.....	$\frac{1}{2}$ assay ton.
Bicarbonate of Soda.....	30 grammes.
Carbonate of Potash.....	15 grammes.
Litharge.....	25 grammes.
Argols or Flour.....	1 to 2 grammes.

Mix thoroughly and place in a crucible; now sprinkle considerable borax glass on the top, and the crucible is ready for the furnace. If the ore contains much sulphur, such as iron pyrites, or concentrates with little or no silica, the following charge might give satisfaction:

Ore.....	$\frac{1}{2}$ assay ton.
Bicarbonate of Soda.....	30 grammes.
Carbonate of Potash.....	15 grammes.
Litharge.....	25 grammes.
Silica.....	15 grammes.
Borax Glass.....	5 grammes.

Mix well and put in crucible three iron nails. If much lead is in the ore reduce the amount of litharge accordingly; a covering of borax and the charge is ready for the furnace. Have the muffle fairly hot and place crucible inside, close the muffle door and keep the heat regular. Crucible assays should be allowed to be in the furnace from thirty to forty minutes; when fusion is complete the flux will be seen perfectly still. Now remove crucible and pour contents into a mould; when cool clean the button and hammer into shape; it is then ready for cupellation. The method from this on is exactly the same as in scorification.

In some low grade ores, or ores containing no silver, it is a good plan to add a small quantity of pure silver to the lead button before cupelling; this will serve to collect the gold and have a larger button for subsequent treatment with nitric acid.

RAPID ASSAY METHODS

In the quantitative determination of elements in ores, rocks and metallurgical by-products, delicate but laborious schemes are used to obtain a careful and complete analysis. When, however, the principal constituents are required, with results reasonably accurate for practical metallurgical purposes, the tedious gravimetric processes have been replaced in smelting works by quicker volumetric schemes, which enable the chemist to turn out a large number of determinations in a day; moreover, by continued daily use of these methods the chemist has been enabled to approach, and even to equal in accuracy, the more elaborate schemes before mentioned. The following processes have given satisfaction:

Silica. (SiO_2).—Charge 0.5 gramme. Run to dryness with 5 cc's hydrochloric acid and 3 cc's nitric acid (replace hydrochloric acid by nitric acid according to the amount of sulphides present), take up with hydrochloric acid, add hot water, boil and filter, wash with hot water, and once with ammonia acetate, dry first in annealing cup or porcelain crucible before muffle, ignite, and weigh as silica.

ASSAYING—CONTINUED

Barium Sulphate. (BaSO_4).—When the chemist has reason to suppose that the ores contain barium sulphate, the silica, after weighing as above, is fused in a platinum crucible with about 5 grammes of a mixture of equal parts of sodium and potassium carbonates, dissolved in hot water, filtered, and washed; then dissolve the barium carbonate through the filter in dilute hydrochloric acid, add water, then sulphuric acid, boil hard, filter, ignite, and weigh as barium sulphate, which subtracted from the original weight gives silica.

Iron. (Fe).—The filtrate from the silica is boiled, reduced while hot by the addition of a few drops of strong stannous chloride (made by dissolving metallic tin in hydrochloric acid), allowed to cool, mercuric chloride added in large excess, and titrated with a standardized solution of bichromate of potassium, (4.39 grms. to the litre of water), using a very weak solution of ferri-cyanide of potassium as indicator. (1 cc. bichromate solution equals 0.005 grms. iron.) Instead of reducing the iron as above, if it is desired to determine lime, the iron is precipitated by ammonia water, boiled, filtered off, dissolved through filter by dilute hydrochloric acid, reduce and continue as before, and the filtrate from the iron is treated for lime by immediately adding oxalate solution as below.

Lime. (CaO).—Charge 0.5 gm. Dissolve in 5 cc's hydrochloric acid and 3 cc's nitric acid, neutralize with ammonia water without adding great excess, re-dissolve the iron by adding a very hot solution of oxalic acid, boil hard, settle, decant twice on filter and wash until washings fail to discolor a drop of permanganate of potassium in dilute sulphuric acid. Wash precipitate through filter into a beaker containing hot sulphuric acid, boil, titrate hot with a solution of permanganate of potassium (5.7 grms. to the litre of water). Iron standard of permanganate of potassium multiplied by 0.5 gives the standard for lime, or in other words 1 cc. permanganate equals 0.005 grms. lime.

Magnesia. (MgO).—The filtrate from the lime is treated with large excess of ammonia and a solution of sodium phosphate added, about 5 grammes dissolved in water; the mixture is allowed to stand twelve hours in a cool place, filtered, washed with dilute ammonia and cold water, ignite in assay muffle and weigh as magnesium pyrophosphate, from which magnesia is obtained by multiplying the result by 0.36036.

Zinc. (Zn).—Charge one gramme in covered casserole, add 20 grms. ammonia nitrate salt and 5 cc's nitric acid, run to dryness, cool, and add 20 cc's hot water and 15 cc's ammonia, boil four minutes, filter, and if filtrate has a brownish tinge (due to manganese) add 10 cc's more ammonia, boil with cover off and refilter, make acid with hydrochloric acid and add 7 cc's excess, also 30 grms. granulated lead, or less according to the amount of copper present as indicated by blue color; let stand until the solution clears, or place filtrate and lead in a small flask, and shake to precipitate the copper. Let cool, titrate with solution of ferro-cyanide of potassium (45 grms. to the litre of water), using acetate or nitrate of uranium as indicator. 1 cc. of solution used equals 0.01 gm. of zinc.

Manganese. (Mn).—Charge 0.5 gramme. Dissolve in 5 cc's hydrochloric acid, add 5 cc's nitric acid, neutralize with emulsion of zinc oxide, filter into a large flask, dilute with water to about 400 cc's, boil hard and titrate quickly with permanganate of potassium, shaking the flask vigorously after each addition. The iron standard multiplied by 0.294 gives the standard for manganese.

Alumina. (Al_2O_3).—In fire clays, etc., not soluble in acids. Fuse 0.5 gm. in a platinum crucible with 5 to 7 grms. of mixed alkaline carbonates, dissolve in hydrochloric acid, run to dryness, take up with hydrochloric and nitric acids and filter off the silica (this scheme applies to any substance insoluble in acids in which silica is desired). The chemist should be careful in testing lead ores to dissolve out the lead with nitric acid before fusing in a platinum dish). The filtrate is neutralized and boiled with caustic potash. The iron is filtered off and determined if desired. Add hydrochloric acid very slight excess to the filtrate, and add ammonia, boil, filter ignite precipitate, and weigh as Al_2O_3 .

ASSAYING—CONTINUED

Lead.—Weigh $\frac{1}{2}$ to 1 gm. in covered casserole, add 10 cc. nitric acid, warm until red fumes are off, add 10 cc. sulphuric acid and boil to white fumes, cool, add 30 cc. water, boil and filter into 500 cc. flask, washing with cold water.

Wash residue back into casserole, add 5 gm. C. P. ammonium chloride and 1 cc. C. P. HCl, boil until dissolved, add 5-10 cc. ammonium sulphide, boil and filter through the original filter. Rinse lead sulphide back into casserole, add 7 cc. (1-10) sulphuric acid, shake to break up clots, add 25 cc. strong hydrogen sulphide water and filter.

Put filter with contents into casserole, add 5-10 cc. HCl, boil out hydrogen sulphide add few drops nitric acid, then 25 cc. cold water, then slight excess ammonia, and then make distinctly acid with acetic acid. Boil, dilute to 200 cc. with hot water and titrate with ammonium molybdate solution using tannic acid (.1 gm. in 20 cc. water) as indicator until a yellow tinge shows on spot plate.

The ammonium molybdate is made by dissolving 8.5 grms. in one litre water; 1 cc. equivalent to about .01 gm. lead.

To standardize, weigh .4 gm. C. P. lead foil, add 3 cc. nitric acid and 6 cc. water and, after solution, boil just to dryness. Dissolve in 30 cc. water, add 5 cc. sulphuric acid, agitate, settle a short time and filter. Put ppt. and paper into beaker and boil with 10 cc. HCl until paper disintegrated, add 15 cc. HCl, 25 cc. cold water and then 25 cc. or so ammonia to alkalinity. Distinctly acidify with acetic acid, dilute to 200 cc. with hot water, boil and titrate.

Copper. (Cu.)—To the filtrate in 500 cc. flask from lead precipitate (see previous paragraph), is added 5 grammes of powdered or granulated metallic zinc, or sheet aluminum, and the whole allowed to stand until the copper is precipitated from the solution, as indicated by testing a couple of drops of the clear liquid with sulphuretted hydrogen. Ten cc's sulphuric acid are added to dissolve the excess of zinc used, the flask is then thrice filled with hot water and decanted. (These combined decantations can be immediately titrated for iron with permanganate of potassium.) The moss copper is dissolved in 3 cc's nitric acid, red fumes boiled off, 10 cc's ammonia water added and titrated with a solution of potassium cyanide, 25 grms. to the litre of water, (1 cc. equals about 0.005 grammes copper), until the color is nearly bleached, dilute 100 cc's and titration completed. Dissolve about 0.200 gm. of pure copper in about 3 cc's nitric acid, and add 10 cc's of ammonia water, titrate with the cyanide solution, and note the number of cc's required to decolorize. Make calculations accordingly. As cyanide of potash solutions do not remain of constant strength the solution should occasionally be standardized by pure copper as before stated. Some metals interfere in a measure with this method, but is exact enough for practical purposes.

Sub-Iodide Method for Copper.—Digest. 5 to 1 grammes of ore with 5 cc's nitric acid, 5 cc's hydrochloric acid, 10 cc's sulphuric acid, boil until white fumes, add 40 cc's water, boil, and filter through a 9 cm. filter to get rid of lead sulphate, bismuth sulphate, etc., wash with water acidulated with sulphuric acid, do not get over 75 cc's of solution in a No. 2 beaker. Put in solution a piece of aluminum foil or sheet and boil, when effervescence commences boil for about five minutes afterward, decant on a 9 cm. filter and wash, add a little nitric acid to the filter to dissolve any copper that may have been retained, and add to the copper in the beaker, dissolve with nitric acid, care being taken not to have too much solution, transfer into an 8 oz. pear-shaped flask, add $\frac{1}{2}$ gm. potassium chlorate, and boil down to about 2 cc's or until it gets thick; care must be taken not to boil to dryness, take up with 5 cc's water, then add 5 cc's ammonia, boil about a minute, add 6 cc's acetic acid, and 40 cc's water and titrate. Standard solution of hyposulphite of soda: 19 grammes of hyposulphite to 1 litre. One cc. equals about 0.005 gm. copper.

Put in a flask 3 grammes potash iodide, and add at once hyposulphite of soda solution until solution turns yellowish, then add starch solution and titrate, the end reaction being very distinct. Weigh out pure copper and treat same as above and estimate strength of hyposulphite of soda solution (as in the case of cyanide of potash method.)

ASSAYING—CONTINUED

Copper (by Battery.)—Weigh out from $\frac{1}{2}$ to 1 gramme of ore in a No. 2 beaker, just moisten with a drop or two of water, then add from 10 to 15 cc's of strong nitric acid, and 5 to 8 cc's. of sulphuric acid; heat until white fumes of sulphuric acid are given off. Be sure that all of the ore (which is soluble in acids) has been dissolved, then dilute to about 30 cc's, heat again, just to boiling, to disintegrate the mass, filter off residue in which the lead and silica may be determined if desired. Filter solution into a No. 2 beaker, add one or two strips of heavy aluminum foil, and boil for 10 or 15 minutes, which is generally sufficient to insure complete precipitation of the copper. Pour off the solution and wash three times by decantation with hot water. Then add 3 or 4 cc's of strong nitric acid to the contents of the beaker, allowing the acid to flow over the aluminum. Boil to expel the nitrous fumes, decant into another beaker (which should be narrow) and rinse the aluminum with a few cc's of water, just neutralize the solution with ammonia, and add about 15 cc's of 1 to 10 sulphuric acid. Place platinum cylinder into the solution connecting it with the negative or zinc element of the battery; inside of the cylinder place a platinum wire spiral reaching almost to the bottom of the beaker, being careful not to allow the spiral to touch the cylinder.

A very good battery for this purpose is a Bunsen cell; about eight hours is usually required for a total precipitation of copper. To determine if all the copper has been precipitated, dilute solution in beaker so as to raise it over the precipitated copper on the cylinder, and if all the copper has been precipitated there will be no further deposition of copper on the cylinder after an hour. Another test is by removing a drop or two of the solution and testing it with hydrogen sulphide. If test shows that all copper has been removed, then without turning off the current, remove the cylinder and place immediately into a beaker of warm water so as to wash off as quickly as possible all acid from the cylinder. It is always advisable to have two beakers of water so as to give the cylinder two washings, thus insuring a quick and absolute removal of all acids and salts. After cylinder has been thoroughly washed, place into a beaker of alcohol which removes the water; then dry as quickly and carefully as possible, avoiding the oxidation of the copper on the cylinder. The precipitated copper should be a bright rose-red color.

In case the ore contains only a trace of arsenic, antimony or bismuth, the precipitation of the copper on the aluminum, oil may be dispensed with. In that case after the ore has been dissolved and the mass disintegrated, add enough ammonia to just neutralize this solution; and add $\frac{1}{2}$ gramme ammonia nitrate and 15 cc's of 1 to 10 sulphuric acid, place on battery same as before.

Tin. (In alloys.)—The alloy is oxidized with moderately strong nitric acid, the mass mixed with an excess of ammonia and sulphide of ammonia, and digested for some time in a closed flask. In this way the tin is entirely dissolved as a sulphide. The solution is filtered off from the other sulphides, which are then washed with very weak sulphide of ammonia, and dried. From the solution the bisulphide of tin is precipitated by dilute hydrochloric acid, filtered off, washed and dried. It is then gradually heated together with the filter, in a porcelain crucible, with free access of air, at first gently, then ultimately to redness, then cool and moisten with nitric acid and heat to redness, so that it may be entirely converted into binocide of tin, and weigh as such. A fragment of ammonium carbonate is held in the crucible at the end of the operation to remove any sulphuric acid that may have been formed.

Tin. (In ores.)—Dissolve ore in aqua regia, filter off solution containing lead and copper. Dry residue and place in a porcelain crucible and ignite; after all carbon has been burned off, add 3 parts of sodium carbonate and 3 parts of sulphur, then fuse, dissolve this mass in water and filter off silica, acidify filtrate with hydrochloric acid, and pass in hydrogen sulphide; this precipitates the tin sulphide. Filter this sulphide and treat same as above, (in alloys).

ASSAYING—CONTINUED

BLAST-FURNACE SLAGS

To obtain a sample slag which shall be soluble in acids, an iron rod is dipped into a pot of molten slag and the adhering slag quickly cooled in a jet of water. A small portion, 3 grammes, is pulverized exceedingly fine in an agate mortar and the elements determined as follows:

Silica and Lime.—Half gramme charge in porcelain evaporating dish and 2 cc's hot water, stir, add 3 cc's hydrochloric acid and run to complete dryness, stirring meanwhile to prevent spitting, cool, take up with 3 cc's hydrochloric acid, stir, and add hot water, boil and filter, weigh up residue as silica, and determine lime in filtrate as described in method for lime assay after adding about 4 cc's nitric acid to oxidize the iron.

Iron.—Dissolve half a gramme charge in a beaker by adding 25 cc's hot water, stirring, and then adding 10 cc's hydrochloric acid, boil, reduce with stannous chloride, add excess mercuric chloride, and titrate with potassium bi-chromate, as in the method of iron assay.

Manganese.—Treat half a gramme charge in a porcelain evaporating dish using inverted funnel for cover, with 5 cc's nitric acid, 2 cc's sulphuric acid, and 1 cc. hydrochloric acid, heat just to pasty condition, take up with water and 2 cc's nitric acid, neutralize with zinc oxide, and proceed as in the method for manganese assay.

Slags have been repeatedly analyzed for silica, iron, lime and manganese by the above methods, in forty minutes.

ARSENIC AND ANTIMONY

(L. B. SKINNER AND R. H. HAWLEY)

Solutions.—Copper, Zinc Chloride. To one pound C.P. stick zinc add 500 cc. water and then gradually add 1200 cc. C.P. hydrochloric acid. Boil this solution until the boiling point reaches 108° C.

Dissolve 300 grams C.P. cupric chloride in one litre C.P. hydrochloric acid and mix this solution with the zinc chloride made as above.

Standard Iodine. Dissolve 75 grams potassium iodide in the smallest amount of water possible and to this add 34 grams of iodine. After the iodine is all dissolved make up to two litres, which should give a solution such that one cc. is equivalent to .005 grams arsenic. Weaker standard solutions may be used for more delicacy.

To Standardize. Take 300 milligrams C.P. arsenious acid (As_2O_3), dissolve in about 2 grams caustic soda in water, dilute to 200 cc., acidify faintly with hydrochloric acid, cool thoroughly, add 2 grams sodium bicarbonate and then some starch solution, titrating to a permanent blue color.

300 milligrams arsenious acid multiplied by .7576 gives .2273 grams arsenic. This weight divided by the number of cc. used gives the value per cc.

Run a blank on the zinc copper chloride solution by dissolving 300 mgrm. arsenious acid in caustic soda acidifying with HCl, precipitating with hydrogen sulphide and distilling as outlined in the scheme following. This on the same amount of arsenic may show a higher burette reading owing to impurity in the copper chloride used. Deduct the number of cc. over the standard from all regular determinations.

Ores.—For heavy sulphide ores low in arsenic weigh in 25 gm. of finely ground pulp, digest with 100 cc. C.P. nitric acid in a 6-inch porcelain dish (the acid being added slowly), boil out red fumes, add 75 cc. C.P. sulphuric acid and boil to copious white fumes. Cool the dish, add about 150 cc. water, 50 cc. HCl (10 gm. tartaric acid, if Sb is to be determined), and carefully boil to dissolve all salts.

Filter into a No. 6 beaker, nearly neutralize the filtrate with ammonia, heat to about 70° C. and add slowly, with stirring, a mixture of 15 cc. ammonia bisulphite and 30 cc. ammonia until almost all the red color has disappeared, showing a thorough reduction. Add a little HCl to decompose all the sulphite and boil until there is no odor of sulphurous acid.

ASSAYING—CONCLUDED

While hot, pass sulphuretted hydrogen in a lively manner for about 30 minutes or until precipitation is complete; filter through 11 cm. paper and test filtrate with hydrogen sulphide. The washed ppt., with paper, is put into distilling flask and 50 cc. of the copper zinc chloride solution is poured in through a funnel reaching below the side opening. If the ppt. is too bulky to get in with ease, it may be dried some.

The distilling apparatus is a 6 or 8 oz. flask with the side arm bent down to fit into a Liebig condenser set vertically. Heat is supplied by a small flame such as that from an alcohol burner. The lower end of the condenser just dips into about 40 cc. of water in a No. 1 beaker. A thermometer is inserted through a rubber stopper fitting the neck of the flask so that the bottom end is $\frac{1}{4}$ -inch from the bottom of the flask.

After charging the distilling flask, heat is applied and the distillation proceeded with until the thermometer registers 115°C . This should take about 15 minutes and the arsenic should be all over; to make sure, the stopper may be removed, 10 cc. HCl added and a second distillation made. Some elementary sulphur distills over, but this does no harm.

Pour distillate into No. 3 beaker, add excess ammonia, just acidify with HCl, cool thoroughly, add sodium bicarbonate and starch solution and titrate with standard iodine solution to first permanent blue color, deduct the excess found in the blank and calculate the arsenic.

Antimony.—Add about 50 cc. saturated zinc chloride solution to the residue in the flask, replace the thermometer by a glass tube reaching nearly to the level of the liquid and through this tube pass hydrochloric acid gas generated by sulphuric acid, dropping from a separatory funnel into liquid HCl at the rate of about two drops a second.

The condenser is sealed as before with cold water and heat is applied to the flask until the mass is about dry, removing the beaker from the condenser every few minutes to see if the antimony has ceased coming over. To these beakers is added a little tartaric acid to keep the antimony in solution, ammonia is added to nearly neutralization and hydrogen sulphide passed through to precipitate the orange red sulphide. When the beaker last removed shows only a small amount of precipitate, stop heating the flask, combine the distillates, thoroughly ppt. with H_2S , filter on a tared gooch crucible, heat about one hour at 255°C . to constant weight and multiply by .714.

Do not heat too strongly or copper will come over which may be told by the darkening of the orange red ppt.

This scheme may be most satisfactorily used for 1 gram. charges on high arsenic ores by using the usual amounts of acid for casserole work, not filtering off gangue where the amount is low and not neutralizing the filtrate before the reduction with bisulphite.

Sulphur. (S.)—Charge one gramme in iron dish with about 10 grammes of a mixture of 5 parts of carbonate of soda and 3 of nitrate of potassium, heat slowly in a muffle until the mass swells up; cool, dissolve in hot water, filter, make acid with hydrochloric acid, add solution of barium chloride, boil hard, settle, decant, filter, ignite, and weigh as barium sulphate, multiply the result by 0.1374 to obtain sulphur. Or the ore may be treated with nitric acid, boil nearly to a dryness, take up with hydrochloric acid, boil until the nitric acid is entirely evaporated, dilute with water, filter, add water to about 300 cc's, warm, and add excess barium chloride, filter, wash precipitate well, ignite, and weigh as above.

ATOMIC WEIGHTS

The Atomic Weights given in the following tables were published by THE JOURNAL OF THE AMERICAN CHEMICAL SOCIETY, Vol. XXI., No. 2, February, 1900. These Atomic Weights were used in figuring the factors for calculating gravimetric analysis.

NAME	Sym.	Atomic Weight	Melting Point°C	Properties	QUALITATIVE TESTS
Aluminum...	Al	27.1	700	Tin white metal.	NH ₄ OH ppt. white Al(OH) ₃ , only slightly sol. in excess NH ₄ OH, but sol. in excess fixed alkalis.
Antimony...	Sb	120.0	432	Bluish white, brittle metal.	Marsh test—SbH ₃ burns giving velvety brown lustre on cold porcelain, a drop of HNO ₃ turns it white—H ₂ S gives orange red ppt.
Argon.....		39.97	...	Colorless, odorless gas.	
Arsenic.....	As	75.0	...	Volatilizes at 450°. Crystalline solid.	Marsh test—AsH ₃ burns giving steel gray lustre on cold porcelain, a drop of HNO ₃ dissolves it—H ₂ S gives a yellow ppt.
Barium.....	Ba	137.43	475	Yellow white metal.	A drop of H ₂ SO ₄ gives immediate ppt. of BaSO ₄ . Distinguished from SrSO ₄ and CaSO ₄ by the ppt. being immediate.
Beryllium...	Be	9.08	?	Steel colored, hard crystals.	Distinguished from Al and Zn by solubility of its hydroxide and carbonate in excess of (NH ₄) ₂ CO ₃ .
Bismuth.....	Bi	208.0	268	Reddish white metal.	1/2 cc. conc. sol. of BiCl ₃ poured into 600 cc. H ₂ O gives white cloud of BiOCl (basic salt).
Boron.....	B	10.95	Very high	Red brown powder, infusible in white heat.	Moisten a borate with conc. H ₂ SO ₄ heat, then moisten this salt with glycerine, this on Pt. wire gives green color in non-luminous flame.
Bromine.....	Br	79.95	-7.2	Suffocating odor. Brown red liquid.	CS ₂ dissolves Br in water solution and turns brown. It bleaches litmus. AgNO ₃ gives a yellow white ppt. of AgBr.
Cadmium....	Cd	112.3	320	White crystalline metal. Malleable and ductile.	H ₂ S ppt. yellow CdS insol. in alkali sulphides, soluble in dilute hot H ₂ SO ₄ .
Caesium.....	Cs	132.9	26	Silver white ductile metal.	SbCl ₃ ppt. CsSbCl ₄ completely separating it from other alkalis. SnCl ₄ ppt. Cs ₂ SnCl ₆ insoluble in strong HCl but soluble in H ₂ O.
Calcium.....	Ca	40.1	Red heat	Pale yellow metal.	CaSO ₄ ppt. slowly, distinguished from SrSO ₄ by being soluble in conc. (NH ₄) ₂ SO ₄ . Alkaline carbonate immediately ppt. calcium carbonate
Carbon.....	C	12.00	?	Practically infusible. Diamond and graphite.	Tested by the formation of CO ₂ either by the ignition of the substance or by the decomposition of carbonates with a mineral acid.
Cerium.....	Ce	140.0	850	Steel gray color. Burns in Cl gas.	Sodium hypochlorite added to a cerrous salt gives reddish ceric hydrate soluble in warm HCl.
Chlorine.....	Cl	35.45	...	Greenish yellow gas. Suffocating odor.	Bleaches litmus. AgNO ₃ gives ppt. AgCl. If a solution of KI and starch is added to Cl solution a blue color will appear.
Chromium....	Cr	52.14	Over 1775	Light green powder.	Ag salt ppt. dark red Ag ₂ CrO ₄ . Ignition on charcoal gives green mass. Fused in borax bead in Red. or Oxid. flame gives emerald green bead when cold.
Cobalt.....	Co	59.0	1500	Harder than iron. Malleable and ductile.	Add NH ₄ OH and NH ₄ Cl with ferricyanide gives a blood red color as evidence of cobalt. Salts heated in borax bead give blue color.
Columbium..	Cb	93.5	2950		

ATOMIC WEIGHTS—CONTINUED

NAME	Sym.	Atomic Weight	Melting Point°C.	Properties	QUALITATIVE TESTS
Copper.....	Cu	63.6	1054	Red metal. Malleable and ductile.	NH ₄ OH in excess gives a deep blue color. Fused with borax bead in Oxid. flame gives green bead when hot and blue bead when cold.
Decipium...	Dp	171.0?	?	Metal has not been isolated.	The double sulphate of decipium and potassium insol. in saturated solution of K ₂ SO ₄ . Further research required before existence of Dp. can be established.
Didymium...	Di	142.12	?	White ductile metal.	Not yet definitely established as an element.
Dyprosium...	Dy	162.5			
Erbium.....	Er	166.0	?	Metal not isolated.	The spectrum of Er ₂ O ₃ gives characteristic lines.
Europium...	Eu	152			
Fluorine.....	F	19.05		Colorless gas.	The corrosive action of hydrofluoric acid on glass.
Gadolinium...	Gd	157.3			
Gallium.....	Ga	70.0	30	Gray, soft metal.	Passing induction spark over solution and this light through spectroscope gives characteristic lines and colors.
Germanium.	Gr	72.5	900	White brittle metal.	Saturate alkaline solution with NH ₄ HS, add excess mineral acid gives white GrS ₂ .
Glucium....	Ge	72.5	900		
Gold.....	Au	197.3	1045	Soft, yellow metal. Malleable and ductile.	Neither HNO ₃ nor HCl attack it. Aqua Regia dissolves it readily.
Helium.....	He	4.0	271.3		
Hydrogen...	H	1.00		Colorless gas.	Burns with non-luminous flame. This on cold porcelain surface gives H ₂ O.
Indium.....	In	114.8	155		
Iodine.....	I	126.91	114		
Iridium.....	Ir	193.0	?	White lustrous mass, harder than iron.	A yellow curdy ppt. obtained by dissolving IrCl ₃ in excess of (NH ₄) ₂ CO ₃ and neutralizing the greenish yellow liquid with HCl. Insol. in hot and cold water.
Iron.....	Fe	56.0	1550	Gray metal, three varieties, cast, wrought iron and steel.	K ₄ Fe ₂ (CN) ₁₁ Potassium ferricyanide, gives a dark blue color with Ferrous iron. KS(CN) (Potassium sulphocyanide) gives red color with ferric iron.
Indium.....	In	114.0	?	White non-crystalline metal.	Salts moistened with HCl color a non-luminous flame dark blue.
Iodine.....	I	126.85	114	Dark iron gray solid.	CS ₂ dissolves I from water solution and turns violet. Free Iodine colors boiled starch solution blue to violet.
Krypton....	Kr	83.0	810		
Lanthanum...	La	138.5	?	Iron gray metal. Malleable and ductile.	Salts possess an astringent sweetish taste. Salts do not color beads of borax or microcosmic salt.
Lead.....	Pb	206.92	326	Bluish white metal.	K ₂ CrO ₄ ppts. PbCrO ₄ yellow. Soluble in fixed alkalis, insoluble in chromic acid.

ATOMIC WEIGHTS—CONTINUED

NAME	Sym.	Atomic Weight	Melting Point °C	Properties	QUALITATIVE TESTS
Lithium.....	Li	7.03	180	Gray metal.	Examination by spectroscope will detect minute traces. Salt gives red color in non-luminous flame.
Magnesium..	Mg	24.36	500	White malleable metal.	Fixed alkali hydrates ppt. $Mg(OH)_2$ which is soluble in NH_4Cl .
Manganese..	Mn	55.02	1800	Gray brittle metal.	Ignition with alkali and Oxid. agent on platinum foil gives a bright green mass.
Mercury.....	Hg	200.0	- 38.8	Silvery white liquid metal.	HCl ppts. white $HgCl$, which on adding ammonia hydrate is turned black.
Molybdenum	Mo	96.0	Over 1775	White brittle metal.	Dry molybdates heated on platinum foil with conc. sulphuric acid to vaporisation of latter forms on cooling a blue mass.
Neodymium	No	144.27	840		
Neon.....	Ne	20	...		
Nickel.....	Ni	58.70	1450	White, hard, ductile metal.	Ferrihydrides ppt. greenish yellow nickel ferrihydride. Salts give violet borax bead while hot and brown when cold in oxidising flame.
Niobium....	Nb	93.81	?	Steel gray, lustrous metal.	Hydrochloric acid solution with metallic zinc gives a characteristic blue color, then a brown, due to the lower oxide being formed.
Nitrogen....	N	14.04	...	Colorless odorless gas.	Gas does not support combustion.
Norwegium..	Ng	218.92	254	Reddish white metal.	This element precipitates an oxychloride the same as Bi, but unlike Bi this is soluble in alkaline hydrates and carbonates.
Osmium.....	Os	190.8	?	Lustrous blue white metal.	Fuse salt with KOH and KNO_3 , dissolve in water, add NH_4Cl , wash yellow ppt. with very dilute HCl , dissolve in warm water, add K_4FeCn_6 gives violet color.
Oxygen.....	O	16.00	...	Colorless odorless gas.	Smoldering ember begins to blaze when put into the gas.
Palladium...	Pd	106.5	1360	White malleable ductile metal.	NH_4OH ppts. flesh red $NH_4H_2PdCl_4$ soluble in excess; from this solution it may be reprecipitated by HCl with a yellow color.
Phosphorus..	P	31.0	45	Transparent solid, also red phosphorus.	The nitric acid solution of ammonium molybdate gives a yellow ppt. with phosphoric acid and its salts.
Platinum....	Pt	195.2	1775	White metal, malleable and ductile.	Insol. in hot or cold HNO_3 or HCl , but soluble in aqua regia. Add KCl to $PtCl_4$ in neutral solution, not too dilute, add alcohol, gives yellow ppt.
Potassium...	K	39.14	63	White soft metal. Decomposes water.	Identified chiefly by its color flame in spectroscope (purple flame). Test for KCl as above tested for $PtCl_4$ in alcohol solutions.
Praseodymium.....	Pr	140.6	940		
Radium.....	Rd	226.4	...		
Rhodium....	Rh	103.0	2000	Very hard white metal.	Mix mineral intimately with $NaCl$, put into a porcelain boat and heat in atmosphere of Cl_2 , cool, and dissolve in water, gives a rose red powder.

ATOMIC WEIGHTS—CONTINUED

NAME	Sym.	Atomic Weight	Melting Point °C	Properties	QUALITATIVE TESTS
Rubidium...	Rb	85.44	38	Wax-like lustrous metal.	Salts in non-luminous flame give slightly redder tint than potassium. Characteristic lines in spectroscope.
Ruthenium...	Ru	101.7	Over 2000	White lustrous heavy, brittle metal.	Fuse substance on Pt foil with excess of KNO_3 , when cold dissolve in water, giving a strongly colored orange yellow solution.
Samarium...	Sm	150.07	?	Metal has not been isolated.	Some authorities claim samarium to be made up of four bodies.
Scandium....	Sc	44.0	?	Metal has not been isolated.	Gives characteristic lines in spectrum.
Selenium....	Se	79.2	217	Amorphous and crystalline solid.	Pass SO_2 into cold solution of selenious acid a brick red ppt. of selenium is formed. Pass SO_2 into hot solution of selenious acid a black ppt. forms.
Silicon.....	Si	28.4	Very high.	Amorphous, graphoidal and adamantane.	If a salt is fused in microcosmic bead particles of SiO_2 float around undecomposed.
Silver.....	Ag	107.93	954	Whitest of all metals.	Silver salts pptd. by Cl, Br, and I. arsenites ppt. yellow, Ag_3AsO_3 from a neutral solution of a silver salt, soluble in dilute acids.
Sodium.....	Na	23.05	96	Whitish soft metal. Decomposes water.	Identified chiefly by its color flame in spectro-scope (yellow flame). PtCl_4 ppts. red prisms of $(\text{NaCl})_2 \text{PtCl}_4$ from Na solutions slightly acidified.
Strontium...	Sr	87.68	?	White metal. Melts at red heat.	After separating from BaSO_4 , SrSO_4 will be precipitated by H_2SO_4 , distinguished from CaSO_4 by being insoluble in conc. $(\text{NH}_4)_2 \text{SO}_4$.
Sulphur.....	S	32.06	114	Yellow brittle, solid.	Distinctive odor of SO_2 . Sulphuric acid gives immediate ppt. of BaSO_4 by the addition of BaCl_2 .
Tantalum...	Ta	183.0	?	Metal has not been isolated.	An amethyst color is obtained by adding a very small quantity of Ta_2O_5 to a solution of resorcin in sulphuric acid.
Tellurium...	Te	127.5?	455	Amorphous and crystalline solid.	H_2TeO_4 solution saturated with H_2S kept warm in closed flask for some time the liquid becomes brown, TeS_2 being formed.
Terbium.....	Tr	160.0	?	Metal has not been isolated.	Tr_2O_3 dark orange yellow powder becomes colorless when heated in hydrogen.
Thallium....	Tl	204.15	294	Bluish white metal.	Distinguished by its intense green color in a non-luminous flame. Small traces can be detected by the use of the spectroscope.
Thorium....	Th	233.0	?	Grayish white glistening powder.	Saturation of solution of Th salt with K_2SO_4 forms white ppt. insol. in K_2SO_4 solution, but soluble in water.
Thulium.....	Tm	168.5	...		
Tin.....	Sn	119.0	233	Lustrous white metal.	H_2S ppts. brown SnS in dilute acid solution. Thiosulphates do not give a ppt., distinction from As and Sb.
Titanium....	Ti	48.17	?	Black lustrous powder.	Titanium salts with microcosmic salt when heated in reducing flame gives a violet bead when cold.

ATOMIC WEIGHTS—CONCLUDED

NAME	Sym	Atomic Weight	Melting Point °C	Properties	QUALITATIVE TESTS
Tungsten....	W	184.4	?	Steel gray hard crystalline powder.	The addition of H_2S to an acidulated solution of a tungstate gives no ppt., but gives a blue color.
Uranium....	U	240.0	?	Melts at bright red heat. Grayish white metal.	$(NH_4)_2 S$ gives dark brown ppt. $K_4Fe(CN)_6$ gives a reddish brown ppt., soluble in $(NH_4)_2 CO_3$.
Vanadium...	V	51.4	Over 1800	Light gray lustrous powder.	Vanadium salts give colorless bead with borax or microcosmic salt in outer flame, and becoming light green in inner or reducing flame.
Xenon.....	Xe	130.7	-140		
Ytterbium...	Yb	173.0	?	Metal has not been isolated.	Characteristic lines shown by spectrum.
Yttrium.....	Y	89.0	?	Dark gray powder.	Most readily recognized by spark spectrum.
Zinc.....	Zn	65.4	419	Bluish white metal.	NH_4OH gives a white ppt. of $Zn(OH)_2$, soluble in excess of NH_4OH .
Zirconium...	Zr	90.5	Over 1300	Black powder, also grayish crystalline solid.	Addition of hot concentrated solution of K_2SO_4 to Zr salts sol. ppts. white basic sulphate of Zr. insol. in water, nearly insol. in HCl .

FACTORS FOR CALCULATING GRAVIMETRIC ANALYSIS

Substance Weighed	Sought	Factor
AMMONIUM. Ammonium Platinum Chloride $(NH_4)_2 PtCl_6$...	NH_3	0.0767
ARSENIC.		
Arsenic Trisulphide $As_2 S_3$	As	0.6097
Magnesium Pyro-Arsenate $Mg_2 As_2 O_7$	As	0.4828
BARIUM. Barium Sulphate $BaSO_4$	BaO	0.6573
CALCIUM. Calcium Carbonate $CaCO_3$	CaO	0.5604
CHLORINE. Silver Chloride $Ag Cl$	Cl	0.2472
	HCl	0.2542
	NaCl	0.4080
COPPER. Copper Oxide CuO	Cu	0.7989
IRON. Ferric Oxide $Fe_2 O_3$	Fe	0.7000
	FeO	0.9000
LEAD. Lead Sulphate $PbSO_4$	Pb	0.6831
MAGNESIA. Magnesium Pyro-Phosphate $Mg_2 P_2 O_7$	MgO	0.3624
MANGANESE. Manganese Sulphide MnS	Mn	0.6323
	MnO	0.8161
MERCURY.		
Mercurous Chloride $Hg_2 Cl_2$	Hg	0.8494
Mercuric Sulphide HgS	Hg	0.8621
PHOSPHORUS. Magnesium Pyro-Phosphate $Mg_2 P_2 O_7$	$P_2 O_5$	0.6375
	P	0.2783
POTASSIUM.		
Potassium Sulphate $K_2 SO_4$	$K_2 O$	0.5409
	$K_2 O$	0.1939
Potassium Platinum Chloride $K_2 Pt Cl_6$	KCl	0.3068
SODIUM. Sodium Sulphate $Na_2 SO_4$	$Na_2 O$	0.4370
TIN. Stannic Oxide SnO_2	Sn	0.7881
SULPHUR. Barium Sulphate $BaSO_4$	S	0.1371
	SO_2	0.3427
	$H_2 SO_4$	0.4198
ZINC. Zinc Sulphide ZnS	Zn	0.6714
	ZnO	0.8357

CYANIDE

HOW TO DETERMINE PURITY OF POTASSIUM CYANIDE

Take a sample of the KCN to be tested across the thickness of the cake. Reduce this sample by crushing to a fine powder. To one gram of this reduced sample add 100 c.c. of distilled water. Take 10 c.c. of this solution and titrate it with standard Silver Nitrate. The number of c.c. of Silver Nitrate required to produce a permanent precipitate multiplied by five will give the percentage of KCN contained in sample.

The above is not a determination of actual Cyanogen present, but a simple test to give working value of Cyanide.

STRENGTH OF KCN SOLUTION

To 1000 c.c. of distilled water add 6.535 grains of c.p. Silver Nitrate and standardize with a known strength of Cyanide solution.

For determining the amount of Cyanide in solution, take 10 c.c. of the solution (measured in a pipette) and place it in a small beaker; titrate this with the Silver Nitrate solution, until an opalescent precipitate appears. The number of c.c. of Silver Nitrate used in titration will then equal the number of pounds of Cyanide in one ton of the solution.

TESTING CYANIDE

The standard test in use is the so-called Nitrate of Silver test. This test is based on the fact that Cyanides form with Nitrate of Silver, when both are in solution, precipitates. In practice, a given quantity of Cyanide to be tested is dissolved in distilled water and titrated with one-tenth normal solution of Nitrate of Silver. As the curdy white precipitate, Cyanide of Silver, readily dissolves, as long as there is a surplus of Cyanide in the solution present, sufficient Nitrate of Silver solution is added until a permanent milky appearance is obtained. The addition of a small quantity of Chloride of Sodium or Iodide of Potassium will help to give a more distinct reaction to the eye. Each cubic centimeter normal solution of Nitrate of Silver is equal to 0.013 grams pure Cyanide, so the exact strength of the Cyanide is easily ascertained. It is obvious that the strength of the Nitrate of Silver solution may be so adjusted as to save all further calculation. This formula is also useful for estimating the strength of Cyanide solution.

ACIDITY TEST

Place fifty grams of pulp in a bottle suitable for agitating; add 25 c.c. of a deci-normal (N/10) caustic soda solution (as described further on) and 75 c.c. of water; agitate for an hour and filter off the solution. Titrate 20 c.c. of this filtrate with a deci-normal (N/10) solution of Sulphuric Acid, using as an indicator Phenolphthalein or Methyl-Orange.

Five minus the Burette reading, multiplied by 2, will give the number of pounds of lime necessary to add to each ton of ore to keep the Cyanide solution at the proper point of alkalinity.

In connection with the above, lime is presumed to be 65° pure.

It is advisable before making above acid test to agitate fifty grains of ore with 100 c.c. of water, filter and try the filtrate with litmus paper. If this shows a strong reaction, there is a quantity of free acid present, which may be removed by a water wash.

PREPARATION OF N/10 SULPHURIC ACID SOLUTION

Add 30 c.c. concentrated c.p. Sulphuric Acid to a litre of distilled water; make determination of Sulphuric Acid and correct until solution is absolutely normal; each c.c. of this solution then contains .049 grains of H_2SO_4 ; add 100 c.c. of this solution to 900 c.c. of distilled water, and we have the N/10 solution, each c.c. of which contains .0049 Sulphuric Acid.

CYANIDE—CONTINUED

PREPARATION OF N/10 SODIUM HYDRATE SOLUTION

Dissolve about 56 grains of pure Caustic Soda in 1000 cc. of distilled water (this will give a solution slightly stronger than normal). Titrate this with the normal Sulphuric Acid solution, using Litmus or Phenolphthalein for an indicator; make corrections and titrate again until one cc. of this solution is equivalent to one cc. of Sulphuric Acid. Add to 100 cc. of this solution 900 cc. of distilled water and one cc. of this N/10 solution will neutralize one cc. of N/10 Sulphuric Acid solution.

DETERMINATION OF SULPHUR IN H_2SO_4

Place in weighed platinum dish two grains, approximately, of recently heated Sodium Carbonate. Dissolve with a small amount of distilled water, cover and carefully add 25 cc. of Sulphuric Acid to be tested.

Evaporate to dryness on water bath. Remove cover and dry at 180° in air bath to constant weight.

In this process $SO_4 = 96$ has displaced $CO_3 = 60$; the difference in weight of platinum dish and contents before and after adding Sulphuric Acid is proportionate to amount of H_2SO_4 in the 25 cc. Then $(96 - 60) : 98 :: \text{difference in weight} : x$ (H_2SO_4 in 25 cc.). $x \div 25 = .049$.

DETERMINATION OF OTHER CONTENTS OF ORE WHICH WILL DECOMPOSE KCN

Place 500 grams of the ore in a percolator and add 1000 cc. of 10 pounds solution, allowing it to stand for 12 or 16 hours, and then drain slowly. Titrate the drained solution to determine Cyanide contents and note loss in strength.

Make another test with a sample to which lime has been added, as determined by acid test. Note the difference between the two tests, which will represent the loss due to the presence of other decomposing contents of the ore than the acid.

If this loss is heavy, a determination must be made to ascertain the cause.

TO DETERMINE ALKALINITY OF CYANIDE SOLUTION

Take 10 cc. of solution in a small beaker, and titrate it with Silver Nitrate for Cyanide. Add as much more Silver Nitrate as used in the titration, then add an excess of Potassium Ferro-Cyanide; add a drop or two of Phenolphthalein and titrate with N/10 Sulphuric Acid solution.

If the solution contains much zinc, it will be necessary to filter before titrating.

The Burette reading multiplied by .0112 will give the percentage of protective alkalinity of the Cyanide solution, which should be about 2%.

CYANIDE—CONTINUED

AMOUNT OF GOLD AND SILVER IN CYANIDE SOLUTION

Alfred Chiddy's Method

Add to four assay tons (or more) of the solution 10 cc. of 10% solution of lead acetate; then 4 grams zinc shavings; boil a minute; and 20 cc. HCl (strong). When action has ceased, boil again and decant from the ball of spongy lead, which has been decanted a little with a glass rod, and wash same by decantation. Transfer to a piece of filter paper, roll into a compact ball and place (without drying) on a hot cupel in the muffle.

It is best to transfer the compact ball from the filter paper to a piece of c. p. lead foil and then cupel directly or scorify first, then cupel.

Do not add all of the 20 cc. HCl at once, as zinc may break up on account of violent action.

Another Method

Take a piece of c. p. lead foil and form a tray about 5 inches long, $2\frac{1}{2}$ inches wide and $\frac{3}{4}$ inches deep, and evaporate in this tray from one to three assay tons of the solution until dry, and then cupel the lead.

It is seldom necessary to scorify the lead before cupelling, unless the solution is very foul.

Tables of KCN Solutions

1 lb. KCN to 1 ton water.....	0.05% solution
2 lb. KCN to 1 ton water.....	0.10% solution
3 lb. KCN to 1 ton water.....	0.15% solution
4 lb. KCN to 1 ton water.....	0.20% solution
5 lb. KCN to 1 ton water.....	0.25% solution
6 lb. KCN to 1 ton water.....	0.30% solution
7 lb. KCN to 1 ton water.....	0.35% solution
8 lb. KCN to 1 ton water.....	0.40% solution
9 lb. KCN to 1 ton water.....	0.45% solution
10 lb. KCN to 1 ton water.....	0.50% solution
.5 grammes KCN added to 1,000 cc. water.....	0.05% solution
1.0 grammes KCN added to 1,000 cc. water.....	0.10% solution
1.5 grammes KCN added to 1,000 cc. water.....	0.15% solution
2.0 grammes KCN added to 1,000 cc. water.....	0.20% solution
2.5 grammes KCN added to 1,000 cc. water.....	0.25% solution
3.0 grammes KCN added to 1,000 cc. water.....	0.30% solution
3.5 grammes KCN added to 1,000 cc. water.....	0.35% solution
4.0 grammes KCN added to 1,000 cc. water.....	0.40% solution
4.5 grammes KCN added to 1,000 cc. water.....	0.45% solution
5.0 grammes KCN added to 1,000 cc. water.....	0.50% solution

CYANIDE—CONCLUDED

REFERENCE TABLES

Gramme Table, for the Assay of Cyanide Solutions

If $\frac{1}{2}$ Pint of Solution Gives of Fine Metal				One Ton of Solution will Give Fine Metal				If $\frac{1}{2}$ Pint of Solution Gives of Fine Metal				One Ton of Solution will Give Fine Metal			
Gramme	Oss.	Pwts.	Grs.	Gramme	Oss.	Pwts.	Grs.	Gramme	Oss.	Pwts.	Grs.	Gramme	Oss.	Pwts.	Grs.
.0001	0	0	5.5	.0200	2	5	20	.0300	3	8	18	.0400	4	11	16
.0002	0	0	11	.0500	5	14	14	.0600	6	17	12	.0700	8	0	10
.0003	0	0	16.5	.0800	9	3	8	.0900	10	6	6	.1000	11	9	4
.0004	0	0	22	.1000	11	9	4	.2000	22	18	8	.3000	34	7	12
.0005	0	1	3.5	.2000	22	18	8	.4000	45	16	16	.5000	57	5	20
.0006	0	1	9	.3000	34	7	12	.6000	68	15	0	.7000	80	4	4
.0007	0	1	14.5	.4000	45	16	16	.8000	91	13	8	.9000	103	2	12
.0008	0	1	20	.5000	57	5	20	1.0000	114	11	16	2.0000	229	3	8
.0009	0	2	1.5	.6000	68	15	0								
.0010	0	2	7	.7000	80	4	4								
.0020	0	4	14	.8000	91	13	8								
.0030	0	6	21	.9000	103	2	12								
.0040	0	9	4												
.0050	0	11	11												
.0060	0	13	18												
.0070	0	16	1												
.0080	0	18	8												
.0090	1	0	15												
.0100	1	2	22												

Grain Table, for the Assay of Cyanide Solutions

If $\frac{1}{2}$ Pint of Solution Gives of Fine Metal				One Ton of Solution will Give Fine Metal				If $\frac{1}{2}$ Pint of Solution Gives of Fine Metal				One Ton of Solution will Give Fine Metal			
Grains	Oss.	Pwts.	Grs.	Grains	Oss.	Pwts.	Grs.	Grains	Oss.	Pwts.	Grs.	Grains	Oss.	Pwts.	Grs.
.001	0	0	3.5	.060	0	8	23	.070	0	10	11	.080	0	11	23
.002	0	0	7	.090	0	13	10	.100	0	14	22	.200	1	9	20
.003	0	0	11	.300	2	4	19	.400	2	19	16	.500	3	14	14
.004	0	0	14.5	.600	4	9	12	.700	5	4	10	.800	5	19	8
.005	0	0	18	.900	6	14	6	1.000	7	9	4				
.006	0	0	21.5												
.007	0	1	1												
.008	0	1	4.5												
.009	0	1	8												
.010	0	1	12												
.020	0	3	0												
.030	0	4	12												
.040	0	6	0												
.050	0	7	11												

STANDARD SOLUTIONS

An Empirical solution is a standard solution, 1 cc. of which contains sufficient of the active reagent to neutralize 1% of the substance to be estimated, when $\frac{1}{2}$ or 1 gramme of sample is weighed out.

A Normal solution is a standard solution containing in one litre the Hydrogen Equivalent in grammes of the active reagent.

By Hydrogen equivalent in the case of acids and alkalies is meant the acidity or basicity of the substance, as:

Hydrogen Equivalent of H Cl, $36.4 \div 1 = 36.4$

Hydrogen Equivalent of H_2SO_4 , $98.0 \div 2 = 49.0$

Hydrogen Equivalent of NaOH, $40.0 \div 1 = 40.0$

In case of a precipitation the Hydrogen Equivalent would be the valence of the atom precipitated.

In case of the oxidation or reduction, ascertain the atoms of oxygen absorbed or given off by molecule of the active reagent.

Indicators used are Litmus, Methyl Orange, Cochineal and Phenolphthalein. Methyl Orange cannot be used in the presence of vegetable salts and acids. Cochineal cannot be used in the presence of iron salts. Phenolphthalein cannot be used in the presence of NH_3 , CO_2 , and H_2S .

STANDARD NORMAL SULPHURIC ACID SOLUTION

Hydrogen Equivalent of H_2SO_4 , $= 98 \div 2 = 49$.

Weigh out about 50 grammes of H_2SO_4 Sp. Gr. 1.84 and dilute to one litre. Determine the exact amount of H_2SO_4 in this solution by precipitation with Ba Cl₂. From this result figure the exact amount of H_2SO_4 in 1 cc. of solution. The reason 50 grammes are weighed out instead of 49 grammes, the calculated amount, is that C. P. sulphuric acid contains about 97.5% H_2SO_4 (the balance being water).

The amount of H_2SO_4 in one cc. of a normal solution is 0.049 grammes. Suppose it is found that one cc. of acid solution contains 0.0539 grammes of sulphuric acid instead of 0.049, showing it to be too strong, therefore to make it just normal it must be diluted.

$$0.049:0.0539::1000 \text{ cc. } \left\{ \begin{array}{l} \text{cc's taken out to} \\ \text{determine } H_2SO_4 \end{array} \right\} : x \left\{ \begin{array}{l} \text{No. cc's solution} \\ \text{should contain.} \end{array} \right\}$$

Therefore dilute solution to the number cc's it is found that it should contain.

STANDARD NORMAL SODIUM HYDRATE SOLUTION

Hydrogen Equivalent of NaOH, $= 40 \div 1 = 40$.

Weigh out 42 grammes NaOH, dilute to 1 litre. Take an exact number of cc's of this solution, place in a flask, dilute to 150 cc. and add a few drops of Methyl Orange as indicator. Titrate this with standard sulphuric acid. This will give the exact weight of NaOH in sample taken.

49:40::Wt. of sulphuric acid neutralized: Wt. of sodium hydrate neutralized. Divide this result by the number of cc's taken gives weight of NaOH in each cc. of standard solution.

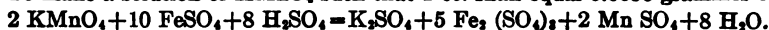
Figure the volume of exact normal solution as above in sulphuric acid. Accurate adjustment to make the solution just normal in this manner is difficult and in most cases it is better to determine factor by which readings must be multiplied in order to correct the difference between the real strength of solution and normal strength.

$$\frac{\text{Actual strength}}{\text{Normal strength}} = \text{factor.}$$

STANDARD SOLUTIONS

STANDARD DECINORMAL KMnO_4 SOLUTION.

To make a solution of KMnO_4 such that 1 cc. shall equal 0.0056 grammes of iron.



One atom of oxygen will oxidize 2 atoms of iron, therefore KMnO_4 will oxidize 5 atoms of iron.

Molec. Wt. of $\text{KMnO}_4 = 158 + 5 = 31.6$.

A decinormal solution will be 31.6 grammes + 10 = 316 grammes.

Therefore weigh out 3.16 grammes KMnO_4 .

Make an empirical solution of KMnO_4 such that 1 cc. of solution will equal 1% of iron when one gramme is weighed out.

From the above equations:

31.6 grammes KMnO_4 in one litre of solution 1 cc. of which = 0.056 grammes iron.

To make 1% solution 1 cc. will have to equal 0.01 gramme Fe.

Therefore $31.6 : 0.056 :: x : 0.01$.

$$31.6 \times 0.01$$

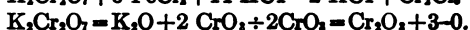
$$0.056$$

$$= 5.64 \text{ grammes } \text{KMnO}_4$$

5.64 grammes KMnO_4 are required to make 1 litre of solution equal to 1% of iron for 1 gramme sample weighed out. Standardize the above solution with a known iron solution. Dissolve .25 grammes of clean piano wire, which contains 99.7% iron, in dilute hot sulphuric acid in a flask, being careful to exclude air from the flask as much as possible. Expel air from flask by adding a small quantity of sodium carbonate. When all iron is dissolved and hydrogen boiled off, dilute to about 150 cc.'s and titrate with KMnO_4 solution.

STANDARD DECINORMAL $\text{K}_2\text{Cr}_2\text{O}_7$ SOLUTION.

Make a solution of $\text{K}_2\text{Cr}_2\text{O}_7$ such that 1 cc. = 0.0056 grammes Fe.



Three atoms of oxygen will oxidize 6 atoms of iron.

Molec. Wt. of $\text{K}_2\text{Cr}_2\text{O}_7 = 296.56 + 6 = 49.4$ grammes.

Weigh out one-tenth of 49.4 grammes = 4.94 grammes for decinormal solution equal 0.0056 grammes iron.

Make empirical solution, such that 1cc. will equal 1% of iron when 1 gramme of sample is taken.

Therefore as above for permanganate solution, we have:

$$49.4 : 0.056 :: x : 0.01$$

$$49.4 \times 0.01$$

$$0.056$$

$$\text{strength.}$$

$$= 8.82 \text{ grammes } \text{K}_2\text{Cr}_2\text{O}_7 \text{ required to make 1 litre of solution of above strength.}$$

To standardize these solutions dissolve .25 grammes of clean piano wire in hydrochloric acid. Treat this the same as in method for the determination of iron by $\text{K}_2\text{Cr}_2\text{O}_7$ solution given under the head "Rapid Assay Methods."

As before stated it is difficult to obtain an accurate normal or empirical solution, therefore it is best in most cases to determine factor. This is figured the same as under Standard Sodie Hydrate solution. The Permanganate solution cannot be used in the presence of hydrochloric acid, arsenic or antimony.

The Bichromate solution is equally effective in both sulphuric and hydrochloric acids.

Courtesy of Western Chemical Mfg. Co.

QUALITATIVE TESTS FOR IMPURITIES IN AQUA AMMONIA

Sulphates.—Dilute the aqua ammonia with distilled water, acidify the solution with strictly chemically pure hydrochloric acid and add a few drops of a solution of barium chloride. If a white precipitate forms, sulphates are present.

Chlorides.—Dilute the ammonia with distilled water, acidify with chemically pure nitric acid and add a few drops of silver nitrate solution. A white precipitate, which redissolves upon the addition of more ammonia, indicates the presence of chlorides.

Carbonates.—Dilute with distilled water, add clear lime water and allow to stand a few minutes. A white precipitate indicates the presence of carbonates.

Organic Matter.—Dilute 10 cc. of aqua ammonia with 10 cc. of distilled water, add 20 cc. of C. P. nitric acid (Sp. Gr. 1.42) very slowly so as to avoid raising the temperature appreciably. A distinct organic odor and a very slight reddish color should develop if organic matter be present.

SOLUBILITY OF METALS IN AQUA AMMONIA,

in the order of their solubility:

Copper — quite soluble.

Zinc,

Nickel,

Cobalt,

Lead,

Iron — Very slightly soluble, if at all.

Aluminium — Very slightly soluble, if at all.

Magnesium — Very slightly soluble, if at all.

IMPURITIES IN C. P. ACIDS

AND TESTS FOR SAME.

Hydrochloric Acid.

FOR IRON.— Dilute, and add KSCN; if it shows a red color there is iron present.

FOR ARSENIC.— Dilute, pass in hydrogen sulphide gas; if a distinct yellow precipitate is obtained it would indicate traces of arsenic; also try by the Marsh test.

FOR SULPHURIC ACID.— Dilute, add barium chloride; a white precipitate would be obtained if sulphuric acid were present.

Nitric Acid.

FOR CHLORINE.— Add silver nitrate, if slight opalescence occurs, it shows presence of chlorine.

Sulphuric Acid.

FOR ARSENIC.— Dilute and pass in hydrogen sulphide gas; if a distinct yellow precipitate is the result it shows the presence of arsenic; also try by the Marsh test.

FOR IRON.— Dilute, add KSCN; if red color appears it shows presence of iron.

In making these tests extreme care should be taken that all of the glassware and apparatus used in the tests are absolutely free from the impurity tested for; also make tests on the distilled water to be used in the examination, so as to be sure the water is perfectly pure.

Always pour acid into water, and not water into acid, to avoid explosions.

Never grind potassium chlorate and sulphur together. It is very explosive.

Formula for Blue Prints:—

Potassium ferricyanide.....150 grms.

Ammonia, citrate of iron.....150 grms.

Water.....600 cc.

Dissolve each of the salts in half the water, mix and coat one side of the paper, dry in dark room. Expose to light and develop by floating in water.

Courtesy of Western Chemical Mfg. Co.

TABLE OF SOLUBILITIES

IN WATER, ALCOHOL, ETHER, CHLOROFORM AND GLYCERINE, OF MEDICINAL
SUBSTANCES, INCLUDING MANY OTHERS OF COMMON OR
FREQUENT USE

ABBREVIATIONS: S., Soluble; V. S., Very Soluble; Sp., Sparingly; A., All Proportions;
Sl., Slightly; Ins., Insoluble; N. Ins., Nearly Insoluble; Dec., Decomposed.

Chemical Substances One Part is Soluble in (at 59° F.) (15° C.) Standard Temperature	PARTS OF				
	Water	Alcohol	Ether	Chloroform	Glycerine
Acetanilide	194	4	V. S.	V. S.	...
Acid, Arsenic	2	...	...	...	5
Arsenous	100	141	...	...	5
Benzoic	400	2	2.5	7	5
Boric	25.6	15	...	...	5
Citric	0.75	1.61	50	N. Ins.	2
Formic	V. S.	V. S.	3	...	S.
Gallic	100	5	40	...	12
Lactic	A.	A.	A.	Ins.	...
Oleic	Ins.	A.	A.	A.	...
Oxalic	3	2.5	N. Ins.	Ins.	7.5
Phosphoric, Glacial	V. S.	V. S.	Ins.	...	...
Picric	86	S.	S.	S.	...
Pyrogallic (see Pyrogallo) .....	...	...	...	...	...
Salicylic	450	2.4	2	80	20
Stearic	Ins.	45	9	S.	...
Succinic	19	8	79	N. Ins.	...
Tannic	1	0.6	N. Ins.	N. Ins.	1
Tartaric	0.8	2.5	250	N. Ins.	A.
Trichloroacetic	S.	S.	S.	Dec.	Dec.
Alcohol	A.	...	A.	A.	A.
Amylic	Sp.	A.	A.	...	...
Methylic	A.	A.	A.	...	...
Alum	8	Ins.	Ins.	Ins.	2.5
Aluminum Hydrate	Ins.	Ins.	Ins.	Ins.	Ins.
Sulphate	1.2	Ins.	Ins.	Ins.	Ins.
Ammonium Benzoate	5	28	Ins.	Ins.	8
Bicarbonate	8	Ins.	...	...	...
Borate	12	...	...	...	...
Bromide	1.5	25	600	...	...
Carbonate	5	Dec.	Ins.	...	5
Chloride	3	Sp. Sol.	Ins.	...	5
Iodide	1	9	Ins.	...	...
Nitrate	0.5	20	...	...	...
Oxalate	234	...	...	...	...
Phosphate	4	Ins.	...	...	...
Sulphate	1.2	Sp.	...	...	...
Amyl Acetate	Ins.	A.	A.	A.	...
Nitrate	Ins.	A.	A.	A.	...
Anilin	33	A.	A.	A.	...
Antifebrin (see Acetanilid) .....	...	...	...	...	...
Antimony Arsenate	Ins.	Ins.	...	...	...
Oxide	Sp.	Ins.	Ins.	Ins.	...
Sulphide	Ins.	Ins.	...	...	...

TABLE OF SOLUBILITIES

CONTINUED

Chemical Substances One Part is Soluble in (at 59° F.) (15° C.) Standard Temperature	PARTS OF				
	Water	Alcohol	Ether	Chloroform	Glycerine
Antimony and Potassium Tartrate.....	17	Ins.	Ins.	20	20
Arsenic Bromide.....	Dec.	...	...	...	...
Iodide.....	7	30	Sol.	...	...
Trioxide.....	90	145	...	...	...
Barium Acetate.....	1	100	...	...	...
Bromide.....	V. S.	S.	...	...	...
Carbonate.....	Ins.	N. Ins.	...	...	...
Chloride.....	2½	Ins.	...	...	10
Nitrate.....	8-12	Ins.	...	...	...
Benzene.....	Ins.	...	S.	S.	...
Bismuth Chloride.....	Ins.	Ins.	...	...	...
Citrate.....	Ins.	Ins.	...	...	...
Oxide.....	Ins.	Ins.	...	...	...
Oxyiodide.....	Ins.	Ins.	...	...	...
Subcarbonate.....	Ins.	Ins.	Ins.	...	...
Subgallate.....	Ins.	Ins.	Ins.	...	...
Subnitrate.....	Ins.	Ins.	...	...	...
Tannate.....	Ins.	Ins.	...	...	...
And Ammonium Citrate.	V. S.	Sp.	...	...	...
Bromine.....	30	S. (Dec.)	S. (Dec.)	S.	...
Brucine.....	750	2	Ins.	...	50
Cadmium Acetate.....	V. S.	...	...	...	...
Chloride.....	0.7	S.	...	...	...
Iodide.....	2	Sol.	...	...	...
Salicylate.....	68	S.	5	Ins.	S.
Sulphate.....	V. S.	V. S.	...	...	...
Calcium Acetate.....	S.	S.	...	...	...
Benzoate.....	18	...	...	...	...
Bromide.....	0.7	1	...	...	...
Carbonate.....	Ins.	Ins.	Ins.	Ins.	...
Chloride.....	1½	8	Ins.	Ins.	...
Hypophosphite.....	6.8	Ins.	...	...	...
Hyposulphite.....	1	...	...	...	...
Iodide.....	½	S.	...	...	...
Phosphate.....	Ins.	Ins.	Ins.	...	...
Sulphate, dried.....	390	Ins.	...	...	...
Sulphite.....	800	...	...	...	20
Camphor.....	Sp.	V.S.	V. S.	V.S.	...
Canada Balsam.....	Ins.	2.33	S.	S.	...
Carbon Disulphide.....	535	V. S.	V. S.	V. S.	...
Cerium Acetate.....	V. S.	S.	...	...	...
Bromide.....	Sl.	S.	...	...	...
Nitrate.....	S.	S.	...	...	...
Oxalate.....	Ins.	Ins.	Ins.	...	...
Chloroform.....	200	A.	A.	...	...
Chromium Trioxide.....	V. S.	Dec.	Dec.	Ins.	Dec.
Copper Acetate.....	15	16	Ins.	...	10
Ammoniate.....	1½	Ins.	...	...	...

TABLE OF SOLUBILITIES

CONTINUED

Chemical Substances One Part Soluble in (at .57° F.) (15°C.) Standard Temperature	PARTS OF				
	Water	Alcohol	Ether	Chloroform	Glycerine
Copper Chloride.....	V. S.	V. S.	...	...	...
Nitrate.....	S.	S.	...	...	...
Sulphate.....	2.6	500	Ins.	...	3½
Creosote.....	150	S.	A.	A.	...
Cresol.....	65	S.	S.	...	S.
Ether Acetic.....	9	A.	A.	...	...
Sulphuric.....	12	A.	...	A.	...
Ethyl Bromide.....	Sp.	A.	A.	S.	...
Iodide.....	N. Ins.	V. S.	V. S.	...	...
Glycerine.....	A.	A.	Ins.	Ins.	...
Gold Bromide (Mono.).....	Ins.	...	...	...	...
(Tri.).....	S.	S.	S.	...	...
Chloride (Tri.).....	S.	S.	S.	...	...
Iodide.....	Ins.	Ins.	...	...	...
And Sodium Chloride.....	2	S.	...	...	...
Gutta Percha.....	Ins.	Ins.	...	S.	...
Ichthylol.....	S.	Sp.	Sp.	S.	S.
Iron Acetate.....	4	S.	...	...	...
Albuminate.....	S.	Ins.	...	...	...
Arsenate.....	Ins.	Ins.	...	...	...
Bromide.....	S.	S.	...	...	...
Carbonate Saccharated....	Sp.	Ins.	...	...	...
Chloride (Ferric).....	V. S.	V. S.	Sl.	...	...
Citrate.....	S.	Ins.	Ins.	...	...
Hypophosphite.....	N. Ins.	...	...	...	...
Iodide.....	S.	...	...	...	S.
Iodide, Saccharated.....	7	N. Ins.	...	...	...
Nitrate.....	S.	S.	...	...	...
Oxalate.....	N. Ins.	Ins.	...	...	...
Phosphate (Soluble).....	V. S.	Ins.	...	...	...
Pyrophosphate.....	V. S.	Ins.	...	...	...
Sulphate.....	1	Ins.	Ins.	...	4
And Ammonium Chloride.....	S.	Ins.	...	...	...
Ammonium Citrate.....	S.	Ins.	...	...	...
Ammonium Sulphate.....	3	Ins.	...	...	...
Ammonium Tartrate.....	V. S.	Ins.	...	...	13
Potassium Tartrate.....	V. S.	Ins.	...	...	...
Lead Acetate.....	2.3	30	Ins.	3	5
Carbonate.....	Ins.	Ins.	...	...	...
Chloride.....	140	200	...	...	...
Chromate.....	Ins.	...	...	...	...
Iodide.....	2000	Sp.	N. Ins.	...	...
Nitrate.....	2	N. Ins.	...	...	...
Oxide.....	N. Ins.	Ins.	...	...	...
Sulphate.....	N. Ins.	Ins.	...	...	...
Lithium Benzoate.....	3	13	...	...	...
Bromide.....	0.6	V. S.	S.	...	...
Carbonate.....	80	Ins.	Ins.	...	...

TABLE OF SOLUBILITIES

CONTINUED

Chemical Substances One Part is Soluble in (at 59° F.) (15 C.) Standard Temperature	PARTS OF				
	Water	Alcohol	Ether	Chloroform	Glycerine
Lithium Chloride.....	1.7	V. S.	...	...	...
Citrate.....	2	N. Ins.	Ins.	...	S.
Iodide.....	0.6	...	...	...	...
Nitrate.....	2	...	...	...	...
Magnesia.....	N. In.	Ins.	...	...	...
Magnesium Acetate.....	S.	S.	...	...	...
Benzoate.....	V. S.	...	...	...	...
Bromide.....	V. S.	S.	...	...	...
Carbonate.....	N. Ins.	Ins.	...	...	...
Chloride.....	0.6	...	...	...	...
Phosphate.....	350	Ins.	...	...	...
Sulphate.....	1	Ins.	Ins.	...	...
Sulphite.....	40	Ins.	Ins.	...	...
Tartrate.....	122	...	...	...	...
Manganese.....	20	Sp.	...	...	...
Carbonate.....	Ins.	Ins.	...	...	...
Chloride.....	2½	S.	Ins.	...	...
Dioxide.....	Ins.	Ins.	Ins.	...	...
Hypophosphite.....	V. S.	...	...	...	...
Iodide.....	S.	...	...	...	...
Phosphate.....	Ins.	Ins.	...	...	...
Sulphate.....	0.8	Ins.	Ins.	...	...
Menthol.....	Sl.	V. S.	V. S.	V. S.	...
Mercury Bisulphate.....	333	Ins.	Ins.	...	...
Chloride.....	Ins.	Ins.	...	...	...
Corrosive.....	16	3	4	...	2
Mild.....	Ins.	Ins.	Ins.	...	...
Cyanide.....	12.8	15	Sp.	...	4
Iodide, Yellow.....	N. Ins.	Ins.	Ins.	...	...
Red.....	N. Ins.	130	Ins.	S.	3½
Oxide Yellow.....	Ins.	Ins.	...	...	...
Red.....	Ins.	Ins.	...	...	...
Sulphate, Basic.....	2000	Ins.	...	...	...
Sulphide, Black.....	Ins.	...	...	...	...
Red.....	Ins.	Ins.	...	...	...
Naphthalin.....	Ins.	15	V. S.	V. S.	...
Naphthol (Alpha).....	S.	V. S.	V. S.	...	...
(Beta).....	1000	0.75	V. S.	V. S.	...
Nickel Acetate.....	6	Ins.	...	...	...
Bromide.....	S.	S.	S.	...	...
Nitrate.....	2	S.	...	...	...
Phosphate.....	Ins.	...	...	...	...
Sulphate.....	4	Ins.	Ins.	...	...
Nitroglycerine.....	N. Ins.	V. S.	S.	...	...
Paraffine.....	Ins.	Ins.	S.	S.	...
Phenyl Hydrazine.....	Sp.	V. S.	V. S.	...	...
Phosphorus.....	Ins.	S.	80	V. S.	500
Potassa, Sulphurated.....	2	Sp.	...	...	...

TABLE OF SOLUBILITIES

CONTINUED

Chemical Substances One Part is Soluble in (at 59° F.) (15° C.) Standard Temperature	PARTS OF				
	Water	Alcohol	Ether	Chloroform	Glycerine
Potassium Acetate.....	0.36	1.9	Ins.	...	...
Arsenate.....	V. S.	25	...	...	2
Arsenite.....	V. S.	Sp.	...	...	...
Benzoate.....	V. S.	...	...	...	...
Bicarbonate.....	3.2	N. Ins.	Ins.	...	...
Bichromate.....	10	Ins.	Ins.	...	...
Bisulphate.....	2	Ins.	...	...	...
Bisulphite.....	V. S.	...	...	...	...
Bitartrate.....	201	Sp.	Ins.	...	...
Bromide.....	1.6	200	Ins.	...	4
Carbonate.....	1.1	Ins.	Ins.	...	...
Chlorate.....	16.7	Sp.	Ins.	...	30
Chloride.....	3	S.	Ins.	...	30
Citrate.....	0.6	Sp.	...	...	...
Cyanide.....	2	Sp.	Sp.	...	3.5
Ferricyanide.....	4	Sp.	...	...	...
Ferrocyanide.....	4	Ins.	...	...	...
Hydrate.....	0.5	2	Sl.	...	...
Hypophosphite.....	0.6	7.3	Ins.	...	...
Iodide.....	0.75	18	Ins.	...	3
Nitrate.....	3.8	Sp.	Ins.	...	...
Nitrite.....	V. S.	...	...	...	...
Oxalate.....	S.	...	...	...	...
Permanganate.....	16	Dec.	Ins.	...	Dec.
Phosphate.....	S.	...	...	...	...
Sulphate.....	9.5	Ins.	Ins.	...	...
Tartrate.....	1	Ins.	Ins.	...	...
And Sodium Tartrate.....	1.4	N. Ins.	Ins.	...	...
Pyridine.....	A.	V. S.	V. S.	...	...
Pyrogallol.....	17	1	1.2	...	...
Resin.....	Ins.	S.	S.	S.	...
Resorcin.....	0.6	0.5	V. S.	Sl.	V. S.
Saccharin.....	230	30	0.3	...	S.
Silver Acetate.....	100	Sp.	...	...	...
Bromide.....	Ins.	...	...	...	...
Chloride.....	Ins.	...	...	...	...
Cyanide.....	Ins.	Ins.	...	...	...
Iodide.....	Ins.	Ins.	...	...	...
Nitrate.....	0.6	28	...	...	...
Oxide.....	N. Ins.	Ins.	...	...	...
Sulphate.....	200	...	...	...	...
Sodium Acetate.....	1.4	30	Ins.	...	...
Arsenate.....	4	Sp.	...	...	2
Arsenite.....	S.	Sp.	...	...	...
Benzoate.....	1.8	45	Ins.	...	...
Bicarbonate.....	14	Ins.	Ins.	...	13
Bisulphite.....	4	72	...	...	...
Borate.....	16	Ins.	Ins.	...	2

TABLE OF SOLUBILITIES

CONCLUDED

Chemical Substances One Part is Soluble in (at 59° F.) (15° C.) Standard Temperature	PARTS OF				
	Water	Alcohol	Ether	Chloroform	Glycerine
Sodium Bromide.....	1.2	13	Ins.
Carbonate.....	1.6	Ins.	Ins.	...	1.02
Chlorate.....	1.1	100	5
Chloride.....	2.8	N. Ins.	Ins.	Ins.	5
Citrate.....	V. S.
Formate.....	S.	S.
Hydrate.....	1.7	V. S.
Hypophosphite.....	1	30	Ins.
Iodide.....	0.6	3	Ins.
Nitrate.....	1.3	100	Ins.
Nitrite.....	1.5	Sl.
Phosphate.....	5.8	Ins.	Ins.
Pyrophosphate.....	12	Ins.
Sulphate.....	2.3	Ins.	Ins.	...	S.
Sulphide.....	V. S.	Sl.
Sulphite.....	4	Sp.
Tartrate.....	5	Ins.
Thiosulphate.....	0.65	Ins.
Strontium Bromide.....	1.05	S.	Ins.
Carbonate.....	Sl.
Chloride.....	2	20
Iodide.....	0.6	S.	Sl.
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